

## **EMERGENCY SAFETY VENT PLAN**

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## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION AND BACKGROUND .....</b>	<b>1</b>
1.1	SUMMARY OF FACILITY INFORMATION .....	1
1.1.1	<i>Fixed Hearth Incinerators</i> .....	1
1.1.2	<i>Rotary Kiln Incinerator</i> .....	3
1.2	DESCRIPTION OF THE ESV SYSTEM .....	4
<b>2.0</b>	<b>ESV SYSTEM INVESTIGATION, DOCUMENTATION AND REPORTING .....</b>	<b>7</b>
2.1	ESV INVESTIGATION .....	7
2.2	DOCUMENTATION OF ESV OPENING .....	7
2.3	REPORTING OF ESV OPENINGS .....	8
<b>3.0</b>	<b>PROCEDURES DURING AN ESV .....</b>	<b>9</b>
3.1	STOPPING WASTE FEED AND SHUTTING DOWN THE COMBUSTOR .....	9
3.2	MAINTAINING COMBUSTION CHAMBER TEMPERATURE .....	9
3.3	MAINTAINING NEGATIVE COMBUSTION CHAMBER PRESSURE .....	9
3.4	SHUTTING DOWN THE COMBUSTOR .....	9
3.5	DOCUMENTATION OF COMBUSTION CHAMBER PRESSURE AND TEMPERATURE MAINTENANCE .....	10

## LIST OF TABLES

TABLE 1-1	REGULATORY REQUIREMENTS FOR AN EMERGENCY SAFETY VENT OPERATING PLAN AND CORRESPONDING SECTION THAT ADDRESSES THE REQUIREMENT .....	2
TABLE 1-2	THERMAL RELIEF VENT OPENINGS .....	5

## 1.0 INTRODUCTION AND BACKGROUND

Onyx Environmental Services, Inc. (Onyx) owns and operates two fixed hearth incinerators (Units 2 and 3) and a rotary kiln incinerator (Unit 4) at its facility located in Sauget, Illinois. These incinerators are subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Hazardous Waste Combustors (HWCs), codified in Title 40 of the Code of Federal Regulations (CFR), Part 63, Subpart EEE (§§ 63.1200 to 63.1214). The NESHAP for HWCs specifies emissions standards which reflect emissions performance of maximum achievable control technologies (MACT), and is commonly referred to as the HWC MACT.

Hazardous Waste Combustors are required to have an Emergency Safety Vent Plan and to keep the plan in the operating record. The *Emergency Safety Vent Plan* must follow the requirements described in § 63.1206(c)(4). This *Emergency Safety Vent Plan* demonstrates Onyx's compliance with these requirements. This plan includes information about the facility as it relates to the Emergency Safety Vent (ESV) systems, and procedures that will be followed during an ESV event. Table 1-1 presents the regulatory references related to the required ESV program and the section of this plan that addresses each specific requirement.

Due to the general applicability of the ESV requirement and the similarity of the incinerator systems, general references to an ESV or incinerator system in this document will imply all three systems. Information that is only applicable to one or two of the three systems will be clearly identified.

### 1.1 Summary of Facility Information

Brief summaries which describe the fixed hearth incinerators and the rotary kiln incinerator are presented in this section.

#### 1.1.1 Fixed Hearth Incinerators

Each of the fixed hearth incinerators includes the following components:

- Feed equipment
- Primary and secondary combustion chambers
- Lime injection system
- Spray dryer absorber (SDA)
- Fabric filter baghouse

**Table 1-1**  
**Regulatory Requirements for Emergency Safety Vent Operating Plan**  
**and Corresponding Section that Addresses the Requirement**

Regulatory Citation	Description	Plan Section
63.1206(c)(4)(i)	Documentation in operating record of an ESV opening while hazardous waste remains in the combustion chamber: (1) Record if ESV by-passed APCS (2) Determine if operation remained in compliance considering the emissions during the ESV	Section 2.2
63.1206(c)(4)(ii)(B)	Information documenting effectiveness of plan's procedures to maintain combustion chamber temperature and pressure, as is reasonably feasible	Section 3.5
63.1206(c)(4)(ii)(B)	Detailed procedures for rapidly stopping waste feed	Section 3.1
63.1206(c)(4)(ii)(B)	Detailed procedures for shutting down the combustor	Section 3.4
63.1206(c)(4)(ii)(B)	Detailed procedures for maintaining temperature in combustion chamber	Section 3.2
63.1206(c)(4)(ii)(B)	Detailed procedures for maintaining negative pressure in the combustion chamber	Section 3.3
63.1206(c)(4)(iii)	Investigation of ESV openings	Section 2.1
63.1206(c)(4)(iii)	Recording of ESV openings	Section 2.2
63.1206(c)(4)(iv)	Reporting of ESV openings	Section 2.3

- Solids and ash removal systems
- Induced draft (ID) fan and stack
- Instrumentation, controls, and data acquisition systems

Various solid and liquid wastes and gaseous feedstreams are thermally treated in the fixed hearth incinerators. Solid waste is fed to the primary (lower) combustion chamber via a feed conveyor system and pneumatic ram. Liquid waste from tanks and tanker trucks are fed to the primary combustion chamber through two atomized liquid injectors. Liquid waste from containers are fed to the primary combustion chamber through a specialty feed injector. A gaseous feedstream is fed to the Unit 2 primary combustion chamber directly from gas cylinders. Off gases from a hooded feed emission control system and from a waste handling glove box are fed directly to the Unit 3 secondary combustion chamber. Combustion chamber temperatures are maintained using natural gas fired to a dedicated burner in both the primary and secondary chambers.

Combustion gas exits the secondary combustion chamber and enters the SDA, which provides acid gas removal and cooling of the combustion gas. Combustion gas exits the SDA and is distributed to the fabric filter baghouses, which provide particulate matter removal. The induced draft fan, located downstream of the baghouses, moves the combustion gas through the system and exhausts the gas through the main stack.

#### *1.1.2 Rotary Kiln Incinerator*

The rotary kiln incinerator includes the following components:

- Waste feed system
- Primary and secondary combustion chambers
- Tempering chamber
- Lime injection system
- Spray dryer absorber
- Carbon injection system
- Fabric filter baghouse
- Solids and ash removal systems
- ID fan and stack
- Instrumentation, controls, and data acquisition systems

Various solid and liquid wastes are thermally treated in the rotary kiln incinerator. Solid wastes are fed to a ram feeder via a clamshell, a drum feed conveyor, and an auxiliary

feed conveyor. A hydraulic ram pushes the solid waste into the kiln. Liquid waste from tanks and tanker trucks is fed to the primary and secondary combustion chambers through atomized liquid injectors. Combustion chamber temperatures are maintained using natural gas fired to a dedicated burner in both the primary and secondary chambers.

Combustion gas exits the secondary combustion chamber and enters the tempering chamber, which provides cooling of the combustion gases. The combustion gas exits the tempering chamber and is distributed between two identical SDAs, which provide acid gas removal and additional gas cooling. A carbon injection system is utilized for controlling dioxin/furan and mercury emissions. The activated carbon is air injected into the combustion gas immediately downstream of the convergence of combustion gases from the SDAs. From the SDAs, combustion gas is distributed to fabric filter baghouses, which provide particulate matter removal. The ID fan, located downstream of the baghouses, moves the combustion gas through the system and exhausts the gas through the main stack.

## **1.2 Description of the ESV System**

Each incinerator is equipped with an emergency safety vent (ESV) located at the top of the secondary combustion chamber. This ESV is a refractory-lined emergency thermal relief vent (TRV) which is held in the closed position by a pneumatic cylinder. The control valve in the line supplying air to the cylinder and the cylinder vent valve which opens the TRV are located in the control room for each unit. Valve locks (with keys attached) are utilized to deter indiscriminate operation of these valves. Opening of the TRV allows hot combustion gas to vent from the combustion system during emergency shutdown events. The purpose of the TRV is to protect the downstream APCS from excessive temperature situations.

Conditions which may warrant a TRV opening are summarized in Table 2-1. Typically, alarms and/or interlocks will be triggered prior to these conditions being present. Alarms provide the operator the opportunity to take measures in attempt to restore proper operating conditions. Otherwise, a controlled cutoff of the waste feeds, an AWFCO, or an emergency shutdown may occur prior to opening the TRV. If hazardous waste is being fed at the time the TRV is opened, the TRV position transmitter will detect the TRV opening and trigger an AWFCO.

**Table 1-2**  
**Thermal Relief Vent Openings**

<b>Parameter</b>	<b>Condition <sup>1</sup></b>
Electrical Supply	Loss of Power
Air Supply	Loss of Air Pressure (TRV will fail open)
ID Fan	Failure/Malfunction
SDA Exit Gas Temperature	> 500 °F
Emergency Shutdown	Operator's Discretion

<sup>1</sup> The operator is permitted to open the TRV if these conditions are present.

Unit 4 is equipped with a second ESV located at the kiln face. This ESV is referred to as the surge vent and is kept closed by a weighted louver. The surge vent will only open if there is a pressure excursion in the kiln sufficient enough to overcome the weighted louver. A deflector separates the escaping combustion gas from the feed, and the surge vent angles to a horizontal opening. This design minimizes the entrainment of solid through the surge vent.

An ESV opening may correspond with a malfunction event. Information regarding operation of the incinerator and the associated control equipment during times of start-up, shutdown and malfunction is provided in the facility *Start-up, Shutdown, Malfunction Plan* (SSMP).

## **2.0 ESV SYSTEM INVESTIGATION, DOCUMENTATION AND REPORTING**

### **2.1 ESV Investigation**

If an ESV opens for any reason during normal operations, the operator is instructed to:

- 1) Verify that all waste feeds to the incinerator are cutoff,
- 2) If possible, operate the ID fan, and
- 3) If possible, maintain normal combustion chamber temperatures on natural gas.

If hazardous waste is in the combustion chamber during a ESV opening, the incinerator supervisor should be notified as soon as possible. The incinerator supervisor will coordinate with technical staff to determine potential causes for the event and to estimate excessive emissions.

### **2.2 Documentation of ESV Opening**

Each instance in which the emergency vent opens will be recorded in the facility operating record. This record will, at a minimum, include the date, time, and the operating mode at the time of the ESV opening. This data is automatically documented in the operating record by the CMS.

If the ESV opens when hazardous waste remains in the combustion chamber (*i.e.*, when the hazardous waste residence time has not expired) during an event other than a malfunction (as defined by the facility SSMP), Onyx personnel will document that an ESV event occurred, determine if the facility remained in compliance with facility emission standards, and record the findings of that determination in the facility operating record. Since the ESV is located upstream from the facility air pollution control devices (APCD), it is understood that combustion gas by-passes these emission control devices during an ESV event. This by-pass will be documented in the facility operating record.

If an ESV opening is attributed to a malfunction and occurs when hazardous waste remains in the combustion chamber, a malfunction recordkeeping form will be completed to document the event.

### **2.3 Reporting of ESV Openings**

If an ESV opening results in a failure to meet the emission standards for the facility, Onyx will submit a written report within five days of the ESV event to Illinois Environmental Protection Agency (IEPA), documenting the results of the investigation and corrective measures taken.

### **3.0 PROCEDURES DURING AN ESV**

In the event of an ESV opening that occurs while burning waste, it is important that waste feed is stopped rapidly, and that combustion chamber temperature and negative pressure are maintained to the extent practical. Following the expiration of the hazardous waste retention time, shutting down the combustor (allowing key components to cool) is equally important. These items are addressed below.

#### **3.1 Stopping Waste Feed and Shutting Down the Combustor**

An ESV opening is likely to be preceded by a AWFCO or safety interlock that causes a waste feed cutoff prior to the ESV opening. The ESV position is also interlocked with the AWFCO system. These redundant measures ensure that waste feeds will be stopped during an ESV opening. If the AWFCO system fails to cutoff wastes to the incinerator, the waste will be manually cutoff in a quick and safe manner. Waste burning cannot resume until the ESV is closed, corrective actions taken, permission is granted from the incinerator supervisor, and all parameters are within limits.

#### **3.2 Maintaining Combustion Chamber Temperature**

Combustion chamber temperatures are maintained using natural gas fired a dedicated burner in both the primary and secondary combustion chambers. If possible, the burning of natural gas will be used to maintain adequate combustion chamber temperatures for the combustion of waste remaining in the incinerator.

#### **3.3 Maintaining Negative Combustion Chamber Pressure**

If possible, the ID fan will be operated during an TRV opening to minimize the quantity of combustion gas that by-pass the air pollution control equipment. Operation of the ID fan during an ESV opening will maintain negative combustion pressure to the full extent that is reasonably feasible. It is likely that the opening of the TRV will cause the system to lose negative pressure (*i.e.* the ID fan cannot induce a strong draft). For surge vent opening, the positive pressure excursion will be temporary, and the ID fan (if operable) will be used to restore negative pressure in the primary chamber, as quickly as possible.

#### **3.4 Shutting Down the Combustor**

An event which causes an ESV opening may require a cold shut down of the combustor in order to perform corrective actions. After sufficient effort is taken to minimize emissions by maintaining the temperature and pressure, the incinerator supervisor will decide if a shut down is warranted. If the ESV opening corresponds with a malfunction

event then the corrective measures taken will be consistent with the procedures prescribed by the SSMP.

### **3.5 Documentation of Combustion Chamber Pressure and Temperature Maintenance**

§ 63.1206(c)(4)(ii)(B) requires that the facility demonstrate that the procedures of this plan are adequate to maintain combustion chamber pressure and temperature while hazardous waste remains in the incinerator, if feasible. The occurrence of an emergency safety vent opening at the Onyx facility is possible only in a select set of circumstances, which are described in Section 1.2 of this plan. If natural gas cannot be burned, it is not feasible to maintain the combustion chamber temperature during an ESV event. Likewise, it is likely that the opening of the TRV will result in the loss of negative pressure. The duration of a surge vent opening will typically be brief and only momentarily prevent maintaining the combustion chamber pressure. The procedures presented in this plan will be followed to minimize the effects of such occurrences.

## **AUTOMATIC WASTE FEED CUTOFF PLAN**

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## TABLE OF CONTENTS

1.0	INTRODUCTION AND BACKGROUND .....	1
1.1	SUMMARY OF FACILITY INFORMATION .....	1
1.1.1	<i>Fixed Hearth Incinerators</i> .....	1
1.1.2	<i>Rotary Kiln Incinerator</i> .....	2
1.2	DESCRIPTION OF THE AWFCO SYSTEM .....	5
2.0	AWFCO OPERABILITY TEST PROCEDURES .....	11
3.0	RESPONCE TO AN AWFCO EVENT .....	12
3.1	REPORTING REQUIREMENTS .....	13
4.0	MANUAL WASTE FEED CUT-OFF PROCEDURES .....	14

## LIST OF TABLES

TABLE 1-1	REGULATORY REQUIREMENTS FOR AN AWFCO PLAN AND CORRESPONDING SECTION THAT ADDRESSES THE REQUIREMENT .....	4
TABLE 1-2	AUTOMATIC WASTE FEED CUTOFF INTERLOCKS .....	6

## **1.0 INTRODUCTION AND BACKGROUND**

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Hazardous Waste Combustors are required to have a functioning system that immediately and automatically cuts off the hazardous waste feed under certain conditions. The Automatic Waste Feed Cut-Off (AWFCO) System must follow the requirements described in 40 CFR 63.1206(c)(3). This Automatic Waste Feed Cut-Off Plan demonstrates Onyx's compliance with these requirements.

This plan includes information about AWFCO systems, procedures for responding to an AWFCO event, and procedures for testing the operability of the AWFCO systems. Table 1-1 presents the regulatory references related to AWFCO Plans and the section of this plan that addresses each specific requirement.

Due to the similarity of the three AWFCO systems (one for each incinerator system), general references to an AWFCO system or incinerator system in this document will imply all three systems. Information that is only applicable to one or two of the three systems will be clearly identified.

### **1.1 Summary of Facility Information**

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- Lime injection system

- Spray dryer absorber (SDA)
- Fabric filter baghouse
- Solids and ash removal systems
- Induced draft (ID) fan and stack
- Instrumentation, controls, and data acquisition systems

Various solid and liquid wastes and gaseous feedstreams are thermally treated in the fixed hearth incinerators. Solid waste is fed to the primary (lower) combustion chamber via a feed conveyor system and pneumatic ram. Liquid waste from tanks and tanker trucks are fed to the primary combustion chamber through two atomized liquid injectors. Liquid waste from containers are fed to the primary combustion chamber through a specialty feed injector. A gaseous feedstream is fed to the Unit 2 primary combustion chamber directly from gas cylinders. Off gases from a hooded feed emission control system and from a waste handling glove box are fed directly to the Unit 3 secondary combustion chamber. Combustion chamber temperatures are maintained using natural gas fired to a dedicated burner in both the primary and secondary chambers.

Combustion gas exits the secondary combustion chamber and enters the SDA, which provides acid gas removal and cooling of the combustion gas. Combustion gas exits the SDA and is distributed to the fabric filter baghouses, which provide particulate matter removal. The induced draft fan, located downstream of the baghouses, moves the combustion gas through the system and exhausts the gas through the main stack.

Hot, wet gas is extracted downstream of the baghouse through a continuous emissions monitoring system. This system features a multi-component infrared gas analyzer that detects hydrogen chloride, carbon monoxide, and water vapor concentrations. An integrated zirconium oxide-based analyzer detects oxygen concentrations.

#### *1.1.2 Rotary Kiln Incinerator*

The rotary kiln incinerator includes the following components:

- Waste feed system
- Primary and secondary combustion chambers
- Tempering chamber
- Lime injection system
- Spray dryer absorber
- Carbon injection system

- Fabric filter baghouse
- Solids and ash removal systems
- ID fan and stack
- Instrumentation, controls, and data acquisition systems

Various solid and liquid wastes are thermally treated in the rotary kiln incinerator. Solid wastes are fed to a ram feeder via a clamshell, a drum feed conveyor, and an auxiliary feed conveyor. A hydraulic ram pushes the solid waste into the kiln. Liquid waste from tanks and tanker trucks is fed to the primary and secondary combustion chambers through atomized liquid injectors. Combustion chamber temperatures are maintained using natural gas fired to a dedicated burner in both the primary and secondary chambers.

Combustion gas exits the secondary combustion chamber and enters the tempering chamber, which provides cooling of the combustion gases. The combustion gas exits the tempering chamber and is distributed between two identical SDAs, which provide acid gas removal and additional gas cooling. A carbon injection system is utilized for controlling dioxin/furan and mercury emissions. The activated carbon is air injected into the combustion gas immediately downstream of the convergence of combustion gases from the SDAs. From the SDAs, combustion gas is distributed to fabric filter baghouses, which provide particulate matter removal. The ID fan, located downstream of the baghouses, moves the combustion gas through the system and exhausts the gas through the main stack.

Hot, wet gas is extracted downstream of the ID fan through a continuous emissions monitoring system. This system features a multi-component infrared gas analyzer that detects hydrogen chloride, carbon monoxide, and water vapor concentrations. An integrated zirconium oxide-based analyzer detects oxygen concentrations.

**Table 1-1**  
**Regulatory Requirements for AWFCO Plan and**  
**Corresponding Section that Addresses the Requirement**

Regulatory Citation	Description	Plan Section
§ 63.1206(c)(3)(i)	Facility must have a functioning AWFCO system	Section 1.0
§ 63.1206(c)(3)(i)(A)	System must cut off waste when any of the following are exceeded: (1) Operating Parameter Limit (2) Emission standard monitored by CEMS (3) Allowable Combustion Chamber Pressure	(1) Section 1.2 (2) Section 1.2 (3) Section 1.2
§ 63.1206(c)(3)(i)(B)	System must cut off waste when span value of any CMS detector is met or exceeded	Section 1.2
§ 63.1206(c)(3)(i)(C)	System must cut off waste upon malfunction of a CMS monitoring an OPL or emission level	Section 1.2
§ 63.1206(c)(3)(i)(D)	Waste cut-off must occur when any component of the AWFCO system fails	Section 1.2
§ 63.1206(c)(3)(ii)	Ducting of combustion gases	Section 3.0
§ 63.1206(c)(3)(iii)	Restarting waste feed	Section 3.0
§ 63.1206(c)(3)(iv)	Failure of AWFCO system	Section 4.0
§ 63.1206(c)(3)(v)	Corrective measures	Section 3.0
§ 63.1206(c)(3)(vi)	Reporting exceedance of emission standard or operating requirement	Section 3.1
§ 63.1206(c)(3)(vii)	AWFCO system testing	Section 2.0
§ 63.1206(c)(3)(viii)	Ramping down waste feed	NA
§ 63.1209(b)(4)	Interlock span of non-CEMS CMS into the AWFCO system	Section 1.2

## 1.2 Description of the AWFCO System

The AWFCO system includes all hardware and software (i.e., control logic) necessary to immediately and automatically cutoff waste feeds to the incinerator in the event that an AWFCO interlock is triggered. Table 1-2 lists the parameter and setpoint for each required AWFCO interlock. In addition to the interlocks specified in Tables 1-2, the following conditions are interlocked with each AWFCO system:

- The span value of each CMS instrument (except for a CEMS instrument)
- CMS Malfunction
- AWFCO System Malfunction

AWFCO interlocks ensure that the pneumatically actuated waste feed block valves cannot open or remain open unless all regulated operating parameters and conditions are within limits. Additionally, the waste feed block valves will fail in the closed position if there is a loss of electrical power or instrument air supply. The parameters interlocked with the AWFCO system are described below in further detail.

- **Maximum Pumpable Hazardous Waste Feedrate** – Each pumpable hazardous waste feed line to the incinerator is equipped with a mass flowmeter. The pumpable hazardous waste feedrate is continuously calculated as the sum of the individual flowrates. If the hourly rolling total (HRT) pumpable hazardous waste feedrate meets or exceeds its limit, an AWFCO interlock is triggered.
- **Maximum Total Hazardous Waste Feedrate** – For Units 2 and 3, solid waste is fed to the primary combustion chamber via a feed conveyor and pneumatic ram. A scale in the feed conveyor monitors the weight of each charge of solid waste. For Unit 4, solid wastes are fed to a ram feeder via a clamshell, a drum feed conveyor, and an auxiliary feed conveyor. The clamshell empties into a hopper equipped with a load cell that monitors each charge weight. The solid feed conveyors are equipped with weigh scales. For each incinerator, the time between charges is used to convert these charge weights to a solid waste feedrate. The solid waste feedrate is summed with the pumpable hazardous waste feedrate to calculate the total hazardous waste feedrate. If the HRT of the total hazardous waste feedrate meets or exceeds its limit, an AWFCO interlock is triggered.

**Table 1-2**  
**Automatic Waste Feed Cutoff Interlocks**

Operating Parameter	Averaging Period	Units	AWFCO Interlock Setpoint	
			Unit 2/3	Unit 4
Maximum Pumpable Waste Feedrate	HRT	lb/hr	3,123	4,262
Maximum Total Waste Feed Rate	HRT	lb/hr	4,301	14,802
Maximum Ash Feed Rate	12-HRT	lb/hr	673	8,777
Maximum Chlorine/Chloride Feedrate	12-HRT	lb/hr	237	274
Maximum Mercury Feedrate Limit	12-HRT	lb/hr	0.0073	0.067
Maximum Semi Volatile Metals Feedrate	12-HRT	lb/hr	3,477	117
Maximum Total Low Volatile Metals Feedrate	12-HRT	lb/hr	1,264	120
Maximum Pumpable Low Volatile Metals Feedrate	12-HRT	lb/hr	1,264	120
Maximum Primary Combustion Chamber Pressure	Instantaneous	in. w.c.	> 0.0 for 5 seconds	> 0.0 for 5 seconds
Minimum Primary Combustion Chamber Temperature	HRA	°F	1,712	1,507
Minimum Secondary Combustion Chamber Temperature	HRA	°F	1,845	1,886
Emergency Safety Vent Position	Instantaneous	--	TRV Open	Surge Vent Open TRV Open
Maximum Baghouse Inlet Temperature	HRA	°F	420	435
Maximum Bag Leak Detector Output	10 seconds	% of scale	> 30 % for 6 minutes	> 15% for 12 minutes
Minimum Carbon Feedrate	HRA	lb/hr	--	6
Minimum Carbon Feeder Exit Pressure	Instantaneous	psig	--	3
Maximum Carbon Feeder Exit Pressure	Instantaneous	psig	--	13
Minimum Carbon Carrier Gas Supply Pressure	Instantaneous	in. w.c.	--	-5
Maximum Carbon Carrier Gas Supply Pressure	Instantaneous	in. w.c.	--	5
Maximum Stack Gas Flow Rate	HRA	acfm	15,534	43,900
Stack Gas Carbon Monoxide Concentration	HRA	ppmdv @ 7% O <sub>2</sub>	100	100
Stack Gas Hydrogen Chloride Concentration	HRA	ppmdv @ 7% O <sub>2</sub>	68	68

Notes: HRA = Hourly Rolling Average  
HRT = Hourly Rolling Total  
12-HRT = 12-Hour Rolling Total  
TRV = Thermal Relief Vent

- **Maximum Ash Feedrate** – The ash concentration of each waste feed is determined in accordance with the Feedstream Analysis Plan. The CMS uses the waste ash concentration and the continuously monitored waste feedrate to calculate the ash feedrate of each waste stream. If the 12-hour rolling total (12-HRT) of the combined ash feedrate meets or exceeds its limit, an AWFCO interlock is triggered.
- **Maximum Chlorine/Chloride Feedrate** - The chlorine/chloride concentration of each waste feed is determined in accordance with the Feedstream Analysis Plan. The CMS uses the chlorine/chloride concentration and the continuously monitored waste feedrate to calculate the chlorine/chloride feedrate of each waste stream. If the 12-HRT of the combined chlorine/chloride feedrate meets or exceeds its limit, an AWFCO interlock is triggered.
- **Maximum Mercury Feedrate** - The concentration of mercury in each waste feed is determined in accordance with the Feedstream Analysis Plan. The CMS uses the mercury concentration and the continuously monitored waste feedrate to calculate the mercury of each waste stream. If the 12-HRT of the combined LVM feedrate meets or exceeds its limit, an AWFCO interlock is triggered.
- **Maximum SVM Feedrate** - The concentrations of cadmium and lead in each waste feed is determined in accordance with the Feedstream Analysis Plan. The semivolatile metals (SVM) concentration in each waste stream is the sum of these metal concentrations. The CMS uses the SVM concentration and the continuously monitored waste feedrate to calculate the SVM feedrate of each waste stream. If the 12-HRT of the combined SVM feedrate meets or exceeds its limit, an AWFCO interlock is triggered.
- **Maximum Total LVM Feedrate** - The concentrations of arsenic, beryllium, and chromium in each waste feed is determined in accordance with the Feedstream Analysis Plan. The low volatile metals (LVM) concentration in each waste stream is the sum of these metal concentrations. The CMS uses the LVM concentration and the continuously monitored waste feedrate to calculate the LVM feedrate of each waste stream. If the 12-HRT of the combined LVM feedrate meets or exceeds its limit, an AWFCO interlock is triggered.

- **Maximum Pumpable LVM Feedrate** – The LVM feedrate from pumpable waste feedstreams are summed to obtain the combined pumpable LVM feedrate. If the 12-HRT pumpable LVM feedrate meets or exceeds its limit, an AWFCO interlock is triggered.
- **Maximum Primary Combustion Chamber Pressure** – The primary chambers for Units 2 and 3 are totally sealed. Both the feed and discharge ends of the kiln (Unit 4) are equipped with an air pressurized double seal system that is comprised of steel spring plates with self-lubricating seal shoes. Fugitive emissions are prevented by these measures and the negative primary combustion chamber pressure maintained by the ID fan. An AWFCO interlock will be triggered if the primary combustion chamber pressure meets or exceeds the maximum limit (0.0 in. w.c. gauge) for greater than five seconds. Continuous video surveillance of the combustion chamber exterior is utilized to determine if an AWFCO caused by high primary combustion chamber pressure corresponds with fugitive emissions. There must be visual evidence of fugitive emissions from the primary combustion chamber for a positive pressure event to be considered an exceedance.
- **Minimum Primary Combustion Chamber Temperature** – The temperature of combustion gas inside the primary chamber is monitored by redundant thermocouples. If the hourly rolling average (HRA) primary combustion chamber temperature meets or exceeds its limit, an AWFCO interlock is triggered.
- **Minimum Secondary Combustion Chamber Temperature** – The temperature of combustion gas inside the secondary chamber is monitored by redundant thermocouples. If the HRA secondary combustion chamber temperature meets or exceeds its limit, an AWFCO interlock is triggered.
- **Emergency Safety Vent Position** – Each incinerator's secondary combustion chamber is equipped with an emergency stack and emergency safety vent (ESV), which is also referred to as the thermal relief vent (TRV). The TRV allows hot combustion gas to vent from the combustion system during certain scenarios to protect the downstream APCS from excessive temperature situations. Unit 4 is also equipped with a second ESV located at the kiln face. This ESV is referred to as the surge vent and provides emergency pressure relief of the kiln. To minimize excessive emissions during an ESV opening, the output from the ESV position

transmitter is interlocked with the AWFCO system. If the ESV position is detected as open, an AWFCO interlock is triggered.

- **Maximum Baghouse Inlet Temperature** – For Units 2 and 3, the baghouse inlet temperature (i.e., spray dryer absorber exit gas temperature) is continuously monitored by a thermocouple. Unit 4 is equipped with redundant thermocouples at the exit of each SDA. If the HRA baghouse inlet temperature meets or exceeds its limit, an AWFCO interlock will occur.
- **Maximum Bag Leak Detector Output** – A triboelectric sensor is located in the duct downstream of the ID fan and continuously monitors the relative particulate matter loading of the gas. An AWFCO interlock will be triggered if the bag leak detector output remains at or above its high-high setpoint for the duration of the alarm delay time.
- **Minimum Carbon Feedrate** – Powdered activated carbon is air injected into the plenum immediately upstream of the Unit 4 baghouses. A calibrated feeder is used to continuously monitor the addition rate of carbon to the carbon-air stream. If the HRA carbon feedrate meets or exceeds its limit, an AWFCO interlock is triggered.
- **Carbon Injection System Operating Pressures** – The Unit 4 carbon injection system is equipped with a high level pressure switch located between the carbon feeder and the eductor. A low level pressure switch is located downstream of the blower that supplies air as the carbon carrier fluid. Both pressure switches have two setpoints, which define the permissible operating range at each location. These setpoints are interlocked with AWFCO system.
- **Maximum Stack Gas Flowrate** – The pressure drop across a pitot tube located in the exhaust stack is utilized to continuously monitor the stack gas flowrate. If the HRA stack gas flowrate meets or exceeds its limit, an AWFCO interlock is triggered.
- **Maximum Stack Gas Carbon Monoxide Concentration** – The CEMS continuously samples and analyzes stack gas for the concentrations of carbon monoxide (CO), and moisture using a multicomponent infrared photometer. The oxygen concentration of the sampled gas is analyzed simultaneously using a

zirconium oxide analyzer. A back-up zirconium oxide O<sub>2</sub> analyzer also monitors stack gas O<sub>2</sub> concentration. These data are used to calculate the stack gas CO concentration on a dry basis, corrected to 7% O<sub>2</sub>. If the CO concentration meets or exceeds the HWC MACT emission standard for CO (100 ppm dry volume, corrected to 7% oxygen), an AWFCO interlock is triggered.

- **Maximum Stack Gas Hydrogen Chloride Concentration** – The CEMS' multicomponent IR photometer also monitors the stack gas hydrogen chloride concentration. CEMS data are used to calculate the stack gas HCl concentration on a dry basis, corrected to 7% O<sub>2</sub>. If the HCl concentration meets or exceeds its limit (equivalent to the Interim HWC MACT hydrogen chloride/chlorine standard), an AWFCO interlock is triggered.

## **2.0 AWFCO OPERABILITY TEST PROCEDURES**

The AWFCO interlocks are tested bi-weekly, as weekly testing would unduly interfere with operations, cause excessive downtime, and substantially increase operating costs. Testing of the AWFCO system is a time-consuming and manpower intensive process. The current testing program has been in place under the RCRA permit for a number of years and has proven to be adequate in detecting problems.

AWFCO system operability testing is conducted by manually simulating input of process conditions to the programmable logic controller (PLC). The simulated input for each OPL will be set outside of limits to trigger the AWFCO interlock and associated alarms. The point at which the simulated input activates the control logic for the closure of the waste feed block valves will be observed and documented. Waste feed valves will not actually close during AWFCO testing. In addition to this AWFCO system control logic testing, the functionality of the waste feed block valves are confirmed during startups, shutdowns, actual AWFCO conditions, and when transitioning to and from warm stand-by mode

Tests of the AWFCO system interlocks and associated alarms are documented on a AWFCO Testing Log and are maintained separately as part of the unit's operating record.

### 3.0 RESPONSE TO AN AWFCO EVENT

While an AWFCO event will trigger an alarm, and automatically (and immediately) cutoff waste feed to the incinerator, the other portions of the incinerator system will remain operational and functioning (the APCS, CEMS, etc). Combustion chamber temperatures will be maintained on natural gas fired to the main burners, if possible.

An AWFCO event is initiated in the following manner:

- 1) An alarm is activated at a level below the permit limit in the case of a maximum limit or above the permit limit in the case of a minimum operating condition. This alarm indicates that the system is approaching a regulatory set point. The alarm also indicates a potential malfunction.
- 2) At this point, the operator reviews the situation and takes action to correct the situation, up to and including a manual shutdown of the affected system. These corrective actions will be consistent with the Startup, Shutdown, and Malfunction Plan (SSMP).
- 3) If the corrective actions taken are not effective, and the operating parameter reaches its permit limit or a permit preemptive set point, an AWFCO is initiated. An AWFCO Log form will be used to document the event.

If an AWFCO event corresponds with an exceedance while hazardous waste remains in the combustion chamber, it must be determined if the event meets the regulatory definition of a malfunction. If such an event is a malfunction, a malfunction recordkeeping form will be used. Regardless of whether the hazardous waste residence time has transpired, if there is an exceedance that corresponds with an AWFCO event the following actions will be taken:

- Investigate the cause of the AWFCO;
- Take appropriate corrective measures to minimize future AWFCOs;  
and
- Record the findings and corrective measures in the operating record.

After an AWFCO has occurred, all operating parameters must be within limits prior to restarting hazardous waste feeds.

### 3.1 Reporting Requirements

If an individual OPL is exceeded ten<sup>1</sup> or more<sup>1</sup> times in a 60-day block period, and each exceedance occurs while hazardous waste remains in the combustion chamber, a written report will be submitted by Onyx to the Illinois Environmental Protection Agency (IEPA). The written report will be submitted within five calendar days of the tenth<sup>1</sup> exceedance and will document the exceedances and results of the investigation and corrective measures taken.

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<sup>1</sup> Exceedances occurring during malfunction are not included in this tally. The Startup, Shutdown, and Malfunction Plan summarizes the reporting requirements associated with exceedances occurring during malfunctions.

#### **4.0 MANUAL WASTE FEED CUT-OFF PROCEDURES**

If an AWFCO interlock fails to cutoff the feed of hazardous waste to the incinerator, the operator will manually cutoff all waste feeds to the incinerator in a quick and safe manner. This response is consistent with the procedure prescribed by the SSMP and will be documented on a malfunction recordkeeping form. The *Program of Corrective Actions for Malfunctions*, Attachment 4 to the SSMP, will be followed for the restoring the AWFCO system.

# **FEEDSTREAM ANALYSIS PLAN**

**Onyx Environmental Services  
Sauget, Illinois**

**June 2004**

## **TABLE OF CONTENTS**

- 1.0 INTRODUCTION**
- 2.0 FEEDSTREAM PARAMETERS**
  - 2.1 Chlorine
  - 2.2 Metals
  - 2.3 Ash
- 3.0 ANALYTICAL RATIONALE**
  - 3.1 Analysis Performed by Onyx
  - 3.2 Analysis Performed by Others
  - 3.3 Manufacturer Data or Other Published Information
- 4.0 APPLICATION OF ANALYSIS FOR FEEDRATE COMPLIANCE**
  - 4.1 Process Planning for Feedstreams
  - 4.2 Process Control for Feedstreams
  - 4.3 Documentation and Recordkeeping for Process Planning and Control
- 5.0 SAMPLING AND ANALYTICAL METHODS**
  - 5.1 Sampling Methodologies
  - 5.2 Documentation and Recordkeeping Associated with Sampling
  - 5.3 Analytical Methodologies
  - 5.4 Documentation and Recordkeeping Associated with Sample Analysis
- 6.0 FREQUENCY OF ANALYSIS**
- 7.0 COMPLIANCE WITH FEED RATES**

## **1.0 INTRODUCTION**

Pursuant to the regulatory requirements found in 40 CFR 63.1206 (c) of the HWC MACT Standard, Onyx Environmental Services, Inc. (Onyx) has developed a Feedstream Analysis Plan (FAP). Its purpose is to provide a system whereby Onyx can sample, analyze, and control the incineration of feedstreams that may contain constituents requiring feedrate limits as specified in the HWC MACT Standard. The FAP also addresses how these activities will be recorded in the facility's operating record.

This FAP is organized such that each of the subsequent sections specifically addresses the six paragraphs under 40 CFR 63.1206 (c) (2) and three paragraphs under 40 CFR 63.1206 (c) (4) in the order in which they are presented in the HWC MACT Standard. In many instances, this FAP will reference the facility's Waste Analysis Plan (WAP). The WAP is an integral part of the RCRA Part B Permit, the Permit Application, and any subsequent revisions or addenda to the Part B Permit or Permit Application.

As required by sections 63.6 (e)(v) and 63.6 (e)(vi) of the HWC MACT Standard, the FAP and other documents containing procedures or information referred to in the FAP will be made available for inspection when requested by the Administrator. The FAP, correspondence with the Administrator concerning the FAP, and any subsequent additions or modifications to the FAP will be kept in the facility's Operating Record. If Onyx is required to submit copies of the FAP or portions of it (or related documents), confidential business information entitled to protection from disclosure will be clearly designated.

## **2.0 FEEDSTREAM PARAMETERS**

There are three feedstream constituents that are specified in the HWC MACT Standard for emission and/or feedrate limitations and that may be present in any given feedstream. These three are:

- 1) Chlorine
- 2) Metals (Mercury, Lead, Cadmium, Chromium, Beryllium, and Arsenic)
- 3) Ash

These three constituents will serve as the feedstream parameters of concern in the FAP as required by 40 CFR 63.1206 (c) (2) (I) of the HWC MACT Standard. Feedstream data applicable to each of these parameters will be obtained for all feedstreams in order to control the incineration of them and remain within the feedrate limits set for them.

### **2.1 Chlorine**

Feedstream data will provide a weight-based percentage of chlorine for each waste feed to the incinerators. These results can be used to both estimate targeted feed rate values and control actual feed rates during incineration.

## **2.2 Metals**

Feedstream data will provide a parts-per-million concentration for each of the listed metals in each of the waste feeds to the incinerators. These results can be used to both estimate targeted feed rate values and control actual feed rates during incineration.

## **2.3 Ash**

Feedstream data will provide a weight-based percentage of ash for each of the waste feeds to the incinerators. These results can be used to both estimate targeted feed rate values and control actual feed rates during incineration.

## **3.0 ANALYTICAL RATIONALE**

In 40 CFR 63.1206 (c) (2) (ii) of the HWC MACT Standard, a facility is required to identify how it will obtain the necessary analysis to comply with these regulations. There are three sources of analytical information that Onyx can use in evaluating the feedstream parameters as described in Section 2.0 of the FAP. They are:

- 1) Analysis performed by Onyx
- 2) Analysis performed by others
- 3) Manufacturer data or other published information

These sources are also referenced in the facility's WAP and the ways in which they can be applied to feedstreams are extensively addressed. Many of the analytical procedures performed as described in the FAP are also required as part of the waste acceptance and management process at Onyx. The information derived from these procedures can then be used in complying with the feedstream limitations for the parameters identified in the FAP.

The three analytical sources can be applied to generator wastes received at the Onyx facility, including those that undergo subsequent blending prior to incineration, and also to wastes that are generated at the facility.

### **3.1 Analysis Performed by Onyx**

The predominate means applicable to this source of analytical information is the methodology described in Section 5.0 of the FAP. Specific analytical methods performed in the facility's laboratory are applied to applicable feedstreams to produce values for the required parameters.

Typically, the feedstream is a waste profile from a generator that has been accepted according to the facility's WAP guidelines. This waste will have had analytical work performed on a sample for an initial acceptance decision and supplemental analysis as required for subsequent shipments of the waste. This analytical work will include

information on the parameters identified in the FAP and can be used to control the incineration of the feedstreams.

In other instances, the feedstreams are wastes blended together at the facility (e.g., bulk liquids and bulk solids) or wastes generated by the facility (e.g., laboratory wastes, incinerator ash). Feedstreams that are the result of blending or other on-site processing steps prior to incineration can have parameters determined from the same analytical methods described in the previous paragraph or by statistically arriving at an average value based on a body of previously analyzed samples. Wastes generated by the facility will have parameters determined from an average value based on a body of previously analyzed samples.

For many feedstreams, the best source of information for the parameters identified in the FAP will be obtained using the technical expertise of Onyx personnel. Examples of these types of feedstreams are labpacks, controlled substances and empty containers. The facility's WAP lists some of these reference sources in Appendix WAP-F.

### **3.2 Analysis Performed by Others**

In situations where Onyx cannot perform the necessary analysis due to the nature of the feedstream (e.g., gases, some reactive materials) or when previous outside analysis of feedstreams that meets the standards of this FAP is available, Onyx will accept the analysis of others in determining parameter values. This analytical information will be evaluated and used to control the incineration of feedstreams in the same manner as analytical information produced at the facility.

### **3.3 Manufacturer Data or Other Published Information**

Many feedstreams have pre-existing information applicable to them that can be used to determine the values of the parameters as identified in the FAP. This can take the form of manufacturer specifications and data, Material Safety Data Sheets, reference sources or other published information. The facility's WAP lists some of these reference sources in Appendix WAP-F. Examples of these types of feedstreams include commercial products, pharmaceuticals, chemical reagents, and gas cylinders. This information will be evaluated and used to control the incineration of these feedstreams in the same manner as analytical information produced at the facility.

## **4.0 APPLICATION OF ANALYSIS FOR FEEDRATE COMPLIANCE**

Feedstream data will be used to maintain compliance for the feedrate limitations to the incinerators. This analysis will be completed prior to the feeding of any material to the incinerators. The documentation of these feedrate compliance methods is required by 40 CFR 63.1206 (c) (2) (iii) of the HWC MACT Standard and outlined in this section of the FAP.

Analytical results can be used to both estimate targeted feed rate values and control actual feed rates during incineration. Analysis from laboratory testing at the facility, analytical results from others, published information, and technical evaluations by Onyx personnel can all be used in complying with feedrate limitations for the parameters identified in the FAP. In addition, these analytical information sources can be used for wastes from generators, wastes blended at the facility, and wastes generated at the facility.

#### **4.1 Process Planning for Feedstreams**

When evaluating analytical results and any additional information applicable to a potential feedstream, a decision must be made whether parameters for that feedstream are acceptable for feeding to the incinerators or if some level of feed preparation is necessary. This step in the feedstream evaluation process is called process planning. It is applied to blending wastes, processing wastes into combustible charges, and determining if wastes can be fed directly to the incinerators as initially received at the facility. This planning is performed based on information from analytical results, incinerator performance capabilities, process operation history, and the technical expertise of the process planning personnel involved.

#### **4.2 Process Control for Feedstreams**

In order to ensure that feedrate limits for the parameters in the FAP are not exceeded during operation of the incinerators, automatic systems must be in place to control the incinerator process. These systems continuously track the feedstream parameters as they are introduced into the incinerators and make the necessary feed adjustments or cut-offs for compliance. Section 7.0 of the FAP addresses these systems and the rationale behind their operation in greater detail.

#### **4.3 Documentation and Recordkeeping for Process Planning and Control**

Documentation of process planning and control is demonstrated by the extensive body of information collected in the facility's data management system, and, if needed, distributed in hard copy form to appropriate personnel. This includes laboratory analysis used for feed preparation, bulk waste storage data, processing directions, and related information. Actual incinerator operations data is recorded in printed summaries, recorded onto digital data storage systems, and is also selectively available on-line. This information will be retained in the operating record for the life of the facility.

### **5.0 SAMPLING AND ANALYTICAL METHODS**

The requirements in 40 CFR 63.1206 (c) (2) (iv) and (v) of the HWC MACT Standard state that a facility must identify the sampling and test methods used for analyzing the feedstreams. The sampling methodology and much of the analytical methodology that is described in Sections 2.0 and 3.0 of the facility's Waste Analysis Plan is applicable to the FAP. Additional sampling and testing information is included in the following paragraphs of this section.

### **5.1 Sampling Methodologies**

Sampling is performed at the Onyx facility to identify waste shipments and also by the generator at their location when making an initial determination on the acceptability of the waste at Onyx. In some instances, an actual sample will not be required because technical personnel at Onyx will have determined that sufficient documentation already exists that identifies information regarding the parameters described in Section 2.0 of the FAP (see also Section 4.0, Paragraph 4.1.12 (2) of the WAP). In order to obtain a representative sample of the waste, specific sampling procedures that are dependent on both the nature of the waste sampled and the type of processes in which the waste will be stored or transferred must be performed. Section 2.0 of the facility's WAP and pertinent appendices in the WAP list these procedures and the ASTM method number (or other EPA approved method) on which they are based. This section in the WAP also addresses the sampling equipment used, the types of intended containment or processes that can impact the sampling, and guidelines on how to ensure that a valid and representative sample is obtained.

### **5.2 Documentation and Recordkeeping Associated with Sampling**

All samples taken at the facility or sent to the facility for analysis are assigned a unique sample identification number. These identification numbers are recorded in a chain-of-custody log and used for tracking the sample through the facility's data collection system. Each sample also has a label affixed to it identifying its contents, the date the sample was taken, and the person who took the sample.

### **5.3 Analytical Methodologies**

#### **CHLORINE**

The analytical procedures and EPA approved methods related to determining the amount of chlorine in a feedstream are found in Appendix WAP-A to the facility's WAP.

#### **METALS**

Feedstreams that require analysis for the metals specified in the HWC MACT Standard will either contain these metals in a non-water-soluble form or a water-soluble form. Samples of feedstreams in a non-water-soluble form will require additional preparation steps prior to analysis. The analytical procedures and EPA approved methods related to determining the amount of listed metals in a feedstream are listed below.

#### Digestion Procedure for Non-Water-Soluble Samples

Method 3051A – Microwave Assisted Acid Digestion of Sediments, Sludges, Soils, and Oils

Procedure for Determining Concentration of Mercury in Sample

Method 7473 – Mercury in Solids and Solutions by Thermal Decomposition,  
Amalgamation, and Atomic Absorption Spectrophotometry

Procedure for Determining Concentration of Arsenic, Beryllium, Cadmium, Chromium  
and Lead in Sample

Method 6010C – Inductively Coupled Plasma-Atomic Emission Spectrometry

**ASH**

The analytical procedures and EPA approved methods related to determining the amount of ash in a feedstream are found in Appendix WAP-A to the facility's WAP.

**5.4 Documentation and Recordkeeping Associated with Sample Analysis**

Documentation of analytical work is accomplished by recording it in laboratory logbooks, entering it into the facility's data management system, and, if needed, distributed in hard copy form to appropriate personnel. All technical files for waste profiles will also include initial laboratory analysis and any applicable subsequent analysis. This information will be retained in the operating record for the life of the facility.

**6.0 FREQUENCY OF ANALYSIS**

In 40 CFR 63.1206 (c) (2) (vi) of the HWC MACT Standard, a facility is required to identify the frequency with which an initial analysis is repeated or reviewed to ensure that it is current. This FAP will require that the analytical information for the feedstreams be re-evaluated on a frequency consistent with that described for all wastes as described in Section 4.1.3 of the facility's WAP. The three events that may trigger a need to update or evaluate the analysis of a given feedstream are:

- 1) Generator notifies Onyx that a feedstream has changed
- 2) Subsequent analysis for a feedstream used by Onyx is inconsistent with the original analysis
- 3) Five years have passed since the last assessment of the feedstream

In order for a feedstream to be considered acceptable again for incineration after one of these events has occurred, the evaluation process as described in this FAP must be completed.

**7.0 COMPLIANCE WITH FEED RATES**

Onyx employs process control systems for the incinerators that monitor, adjust and record feedstreams and the key parameters identified in the FAP that are associated with

them. These systems meet the requirements of 40 CFR 63.1206 (c) (4), paragraphs (i), (ii) and (iii). The systems and the rationale that supports these systems are described in the following paragraph.

#### **7.1 Feed Rate Compliance Systems and Methodology**

After the metals and ash concentrations for feedstreams are determined, they will be entered into the facility's data management systems. These feedstreams are identified in the system under a site tracking number, bulk pit number, or tank number. Once this information is in the waste tracking system, the incinerator control systems are able to import and store the data for use as the waste streams are processed at the incinerators. All waste introduced into the incinerators has an associated site identification designation (receiver number, etc.) so it can be referenced to the appropriate data from the waste tracking system. As weights are recorded at 15 second intervals for each specific waste stream entering the incinerator, computations are being performed to calculate the quantities of metals (as low volatile metals, semi volatile metals, and mercury) and ash that are being incinerated. These quantities are displayed, totalized, and recorded in a manner that will show compliance with the established operating parameter limits for the metals categories and ash. One hour and 12 hour rolling totals are displayed for the incinerator operators for monitoring of these feeds.

**CONTINUOUS EMISSIONS MONITORING SYSTEM  
QUALITY ASSURANCE PLAN**

Prepared for:

Onyx Environmental Services, Inc.  
Sauget, Illinois

Prepared by:

Franklin Engineering Group, Inc.  
Franklin, Tennessee

June 2004

## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION AND BACKGROUND .....</b>	<b>1</b>
1.1	DESCRIPTION OF CEMS.....	1
1.2	OVERVIEW OF REGULATORY REQUIREMENTS.....	2
<b>2.0</b>	<b>CEMS CALIBRATIONS AND PERFORMANCE.....</b>	<b>5</b>
2.1	DAILY DRIFT CHECKS.....	5
2.2	CALIBRATION.....	8
2.3	ABSOLUTE CALIBRATION AUDIT .....	10
2.4	INTERFERENCE RESPONSE TEST.....	10
2.5	RELATIVE ACCURACY TEST AUDIT .....	11
<b>3.0</b>	<b>CEMS MAINTENANCE .....</b>	<b>14</b>
3.1	DAILY SYSTEM AUDIT .....	14
3.2	SPARE PARTS INVENTORY.....	14
3.3	CALIBRATION GAS SUPPLY AND CERTIFICATION.....	15
3.4	CORRECTIVE ACTION FOR MALFUNCTIONING CEMS.....	17
<b>4.0</b>	<b>INTEGRATION OF THE CEMS WITH THE AWFCO SYSTEM .....</b>	<b>18</b>
4.1	EMISSION STANDARDS.....	18
4.2	DRIFT LIMITS .....	19
<b>5.0</b>	<b>RECORDKEEPING AND QUALITY ASSURANCE REVIEWS.....</b>	<b>20</b>
<b>6.0</b>	<b>OPERATOR TRAINING AND CERTIFICATION.....</b>	<b>22</b>

## INDEX OF TABLES

TABLE 1-1	REGULATORY REQUIREMENTS FOR THE CEMS QC PROGRAM AND THE CEMS QA PLAN.....	3
TABLE 2-1	OVERVIEW OF CEMS PERFORMANCE REQUIREMENTS .....	6
TABLE 3-1	SUMMARY OF CONCENTRATION REQUIREMENTS FOR CALIBRATION GASES.....	16

## LIST OF APPENDICES

APPENDIX A	CEMS DATA SHEETS AND CHECKLISTS
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## 1.0 INTRODUCTION

Onyx Environmental Services, Inc. (Onyx) owns and operates two fixed hearth incinerators (Units 2 and 3) and a transportable rotary kiln incinerator (Unit 4) at its facility located in Sauget, Illinois. These incinerators are subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Hazardous Waste Combustors (HWCs), codified in Title 40 of the Code of Federal Regulations (CFR), Part 63, Subpart EEE (§§63.1200 to 63.1214). The NESHAP for HWCs specifies emissions standards which reflect emissions performance of maximum achievable control technologies (MACT), and is commonly referred to as the HWC MACT.

For each incinerator, Onyx utilizes a continuous emissions monitoring system (CEMS) for demonstrating on-going compliance with the carbon monoxide (CO) and hydrogen chloride/chlorine (HCl/Cl<sub>2</sub>) emission standards. These CEMS are subject to the requirements of the Appendix to 40 CFR Part 63, Subpart EEE—*Quality Assurance Procedures for Continuous Emissions Monitors Used for Hazardous Waste Combustors*. This plan has been developed per the CEMS quality assurance (QA)/quality control (QC) requirements. Implementation of this plan will ensure that the CEMS generates, collects, and reports valid data that is precise, accurate, complete, and of a quality that meets the requirement of the HWC MACT Standard and the applicable performance specification.

### 1.1 Description of CEMS

Each incinerator is equipped with an EcoChem Analytics MC3 CEMS, which consists of the following major components:

- Heated stack sample probe
- Heated traced umbilical
- Heated sample pump
- EcoChem MC3 multicomponent infrared (IR) gas analyzer
- Zirconium oxide-based oxygen analyzer
- System controller and data acquisition system

Hot, wet stack gas is drawn through the heated stack sample probe and heat traced umbilical using a heated sample pump. The sampling location is downstream of the induced draft (ID) fan. The umbilical supplies instrument air to the filter probe to allow for automated periodic blowback. It also supplies calibration gases through the sampling system. The stack gas sample is maintained at approximately 185°C through the

sampling equipment and analyzer sample cell to prevent the removal of pollutants from the sample through contact with condensed moisture.

The sample cell consists of multiple mirrors that were adjusted and aligned at the factory to set the path length appropriate for the specific application. The MC3 multicomponent IR photometer uses a Gas Filter Correlation analytical technique to continuously monitor the stack gas concentrations of HCl and CO. The Single Beam Dual Wavelength analytical technique is used to continuously monitor stack gas water vapor (H<sub>2</sub>O) concentrations. A zirconium oxide-based oxygen analyzer is integrated with the MC3 to provide continuous monitoring of the stack gas oxygen (O<sub>2</sub>) concentrations.

A technical description and specification for the CEMS is presented in Section 2.0 of the MC3 *Operations Guide*. Section 2.1.1 documents the lowest range for each component and an accuracy of  $\pm 2\%$  of full-scale value. The lower threshold is 1% of the lowest range. These technical specifications document that the CEMS is capable of meeting the requirements of the Appendix to Part 63, Subpart EEE and Performance Specification 4B of 40 CFR Part 60, Appendix B.

The system controller controls the sampling system temperatures, purge/blowback, calibration checks, data handling, messaging, and alarms. The CEMS controller is integrated with the incinerator data acquisition system, automatic waste feed cutoff (AWFCO) system, and the main control system.

Units 2 and 3 incinerators are both equipped with a backup O<sub>2</sub> analyzer, and Unit 4 is equipped with two backup O<sub>2</sub> analyzers. These analyzers are zirconium oxide cells, COSA model ZFN-11YA1-2Z1. For Units 2 and 3, the backup O<sub>2</sub> analyzer is located in the common duct between the baghouse and the ID fan. The Unit 4 backup O<sub>2</sub> analyzers are located in the duct between the ID fan and the stack.

## **1.2 Overview of Regulatory Requirements**

Cross-references and summaries of the applicable regulatory requirements are presented in Table 1-1. This table indicates the sections, tables, and figures of this document that address each particular requirement.

**Table 1-1**  
**Regulatory Requirements for the CEMS QC Program and the CEMS QA Plan**

<b>Regulatory Reference: Appendix to Subpart EEE of Part 63</b>	<b>Description</b>	<b>CEMS QA Plan Section</b>
Section 3.1.a.1	Checks for component failures, leaks, and other abnormal conditions	3.0 3.1
Section 3.1.a.2	Calibration of CEMS	2.2
Section 3.1.a.3	Calibration Drift determination and adjustment of CEMS	2.1, 2.2 Appendix A
Section 3.1.a.4	Integration of CEMS with the AWFCO system	4.0
Section 3.1.a.5	Preventive Maintenance of CEMS (including spare parts inventory)	3.0 Appendix A
Section 3.1.a.6	Data recording, calculations, and reporting	4.1 5.0
Section 3.1.a.7	Checks of record keeping	5.0
Section 3.1.a.8	Accuracy audit procedures, including sampling and analysis methods	2.3, 2.5 Appendix A
Section 3.1.a.9	Program of corrective action for malfunctioning CEMS	3.4
Section 3.1.a.10	Operator training and certification	6.0
Section 3.1.b	Reporting of excessive inaccuracies	5.0
Section 3.2.1	QA responsibilities	5.0
Section 3.2.2	Schedules for: (1) daily checks (2) periodic audits (3) preventive maintenance	(1) 3.0, 3.1 (2) 2.0, Table 2-1 (3) 3.0
Section 3.2.3	Check lists and data sheets	Appendix A
Section 3.2.4	Preventive maintenance procedures	3.0

**Table 1-1 (Continued)**  
**Regulatory Requirements for the CEMS QC Program and the CEMS QA Plan**

<b>Regulatory Reference: Appendix to Subpart EEE of Part 63</b>	<b>Description</b>	<b>CEMS QA Plan Section</b>
Section 3.2.5	Description of the media, format, and location of all records and reports	5.0
Section 3.2.6	Provisions for review of the CEMS data; revisions or updates of the QA plan based on review	5.0
Section 4.1	Check, record, quantify: (1) Zero Drift (2) Calibration Drift	2.1
Section 4.2	Recording Requirements for: (1) Zero Drift (2) Calibration Drift	2.1 Appendix A
Section 4.3	Daily System Audit	3.1
Section 4.4	Data recording and reporting	5.0
Section 5.1	Relative Accuracy Test Audit (RATA)	2.5
Section 5.2	Absolute Calibration Audit (ACA)	2.3
Section 5.3	Interference Response Test (IRT)	2.4
Section 5.4	Excessive audit inaccuracies	Table 2-1 2.3 2.5

## **2.0 CEMS CALIBRATIONS AND PERFORMANCE**

The CEMS must be operated, calibrated, and maintained to ensure conformance with the Appendix to Part 63, Subpart EEE and the EPA Performance Specification 4B (PS 4B). Calibration drift checks and performance demonstrations are performed periodically on the CEMS based on the following schedule:

- Daily calibration checks for determination of Calibration Drift (CD) and Zero Drift (ZD).
- Quarterly Absolute Calibration Audit (ACA) for determining calibration error (CE) for O<sub>2</sub>, CO, and HCl.
- Annual Relative Accuracy Test Audit (RATA) for determining the CEMS relative accuracy (RA) for CO emissions.

The procedures, QC criteria, corrective actions, and recordkeeping associated with these drift checks and audits are described in this section. A summary of the QC criteria and corrective actions is presented in Table 2-1. Blank data sheets are provided in Appendix A.

### **2.1 Daily Drift Checks**

Daily drift checks are automatically initiated by the CEMS controller. During the automated calibration sequence, calibration gases are injected from pressurized cylinders through the sampling system. The sequence starts with the IR analyzer zero gas that is free of any of the constituents analyzed by the IR analyzer. This zero gas may also serve as the span gas for the integrated O<sub>2</sub> analyzer. The zero gas flows through the system with enough time allowed for the analyzer to fully respond to the gas. Then the analyzer response to the zero gas is recorded for one minute and averaged. The next calibration gas in the calibration sequence is the first IR analyzer span gas. This span gas is a calibration standard that has one or more constituent concentrations at the analyzer span value (this gas may also be used as the zero gas for the O<sub>2</sub> analyzer). The first span gas flows through the system to allow the analyzer enough time to fully respond to the gas. Then the analyzer response to the first span gas is recorded for one minute and averaged. This is then repeated for the second span gas and then possibly a third span gas depending upon the composition of the span gases. The total duration of this calibration sequence has been designed to not exceed the 20 minute maximum allowable CEMS downtime while burning hazardous waste.

**Table 2-1**  
**Overview of CEMS Performance Requirements**

Analyzer Parameter (Span Value)	QC Parameter	Minimum Frequency	QC Limit	Corrective Action
H <sub>2</sub> O (60%)	ZD	Daily	±2% of span	Zero Adjustment
O <sub>2</sub> (25%)	ZD and CD	Daily	±0.5% O <sub>2</sub>	Zero/Span Adjustment
	CD	Daily	±1.0% O <sub>2</sub>	Shut off waste, service/calibrate, conduct ACA
	Cumulative Span Adjustment	Per Adjustment	±1.5% O <sub>2</sub>	Shut off waste, service/calibrate, conduct ACA
	CE	Quarterly <sup>1</sup>	0.5% O <sub>2</sub>	Shut off waste, service/calibrate, conduct RATA
	RA	Annually	1.0% O <sub>2</sub>	Shut off waste, service/calibrate, repeat RATA
CO (200 ppm)	ZD and CD	Daily	±3% of span	Zero/Span Adjustment
	CD	Daily	±5% of span for 6 out of 7 day	Shut off waste, service/calibrate, conduct ACA
	CD	Daily	±6% of span	Shut off waste, service/calibrate, conduct ACA
	Cumulative Span Adjustment	Per Adjustment	±9% of span	Shut off waste, service/calibrate, conduct ACA
	CE	Quarterly <sup>1</sup>	5%	Shut off waste, service/calibrate, conduct RATA
	RA <sup>2</sup>	Annually	5 ppm <sub>dv</sub> @ 7% O <sub>2</sub> (See Section 2.5)	Shut off waste, service/calibrate, conduct RATA

<sup>1</sup> The ACAs for determining the O<sub>2</sub> and CO CE are conducted quarterly, except in a quarter when a RATA is conducted instead.

<sup>2</sup> The RA accuracy for CO is based on the units of the CO emission standard (ppm<sub>dv</sub> @ 7% O<sub>2</sub>). CO data collected from the analyzer during the RATA will include low and or high range values per the normal operating requirements.

**Table 2-1 (continued)**  
**Overview of CEMS Performance Requirements**

Analyzer Parameter (Span Value)	QC Parameter	Minimum Frequency	QC Limit	Corrective Action
CO (3000 ppm)	ZD and CD	Daily	±3% of span	Zero/Span Adjustment
	CD	Daily	±5% of span for 6 out of 7 day	Shut off waste, service/calibrate, conduct ACA
	CD	Daily	±6% of span	Shut off waste, service/calibrate, conduct ACA
	Cumulative Span Adjustment	Per Adjustment	±9% of span	Shut off waste, service/calibrate, conduct ACA
	CE	Quarterly <sup>3</sup>	5%	Shut off waste, service/calibrate, conduct RATA
HCl (1000 ppm)	ZD and CD	Daily	±3% of span	Zero/Span Adjustment
	CD	Daily	±5% of span for 6 out of 7 day	Shut off waste, service/calibrate, conduct ACA
	CD	Daily	±6% of span	Shut off waste, service/calibrate, conduct ACA
	Cumulative Span Adjustment	Per Adjustment	±9% of span	Shut off waste, service/calibrate, conduct ACA
	CE	Quarterly <sup>4</sup>	5%	Shut off waste, service/calibrate, conduct ACA

<sup>3</sup> The ACAs for determining the O<sub>2</sub> and CO CE are conducted quarterly, except in a quarter when a RATA is conducted instead.

<sup>4</sup> A RATA for HCl may be performed annually in lieu of performing an ACA in that quarter.

The drift for each stack gas constituent is determined as the difference between the known constituent concentration in the calibration gas and the analyzer reading. ZD is the drift determined using zero gas. CD is the drift determined using span gases. ZD and CD are determined daily for O<sub>2</sub>, CO, and HCl. ZD for H<sub>2</sub>O is also determined daily.

The ZD and CD are recorded by the CEMS datalogger as a percent of full-scale deviation (Dev%). Given that the "span value" is equal to the "full-scale" value, Dev% is calculated as follows:

$$Dev\% = |Drift\%|$$

$$Drift\% = \frac{\text{reference concentration} - \text{analyzer response}}{\text{span value}} \cdot 100$$

For CO and O<sub>2</sub>, if Dev% for CD exceeds the limits specified in the applicable Performance Specifications in 40 CFR Part 60, Appendix B, the analyzer must be calibrated. If the Dev% for CD is greater than the preset tolerance (Tol%) the instrument technician will notify the incinerator operator and waste feeds will be shut off until corrective measures have been taken. The CD tolerances for both O<sub>2</sub> and CO have been set at the two times the performance specification limits. A calibration failure alarm indicates that the analyzer is out-of-control and must be serviced and recalibrated. An ACA must be conducted to document that the analyzer is within the performance specifications prior to resuming hazardous waste burning.

For CO, if the Dev% for CD is greater than 5% for 6 out of 7 days, then the analyzer is out-of-control and must be serviced and recalibrated. An ACA must be conducted to document that the analyzer is within the performance specifications prior to resuming hazardous waste burning.

Similar requirements for drift limits apply to HCl, except that no performance specifications have been promulgated for CEMS monitoring these parameters. In lieu of limits specified by an EPA Performance Specification, Onyx has developed self-imposed performance specification limits for HCl. These limits are specified in Table 2-1.

## 2.2 Calibration

Calibration of the analyzer will be conducted periodically to ensure that the results of drift checks, ACAs, or RATAs meet the applicable performance specifications. Calibration for each IR channel (H<sub>2</sub>O, CO, and HCl) may be performed daily during the

automated calibration sequence used to determine calibration drift. For each calibration gas used during the automated sequence, the automatic calibration will reset the analyzer response to correspond with the known reference concentrations. Any automated calibration adjustment will be made immediately after the analyzer response to the calibration gas is recorded electronically. The drift determined immediately prior to a calibration adjustment is equal to the magnitude of the adjustment. The oxygen analyzer uses a two-point calibration curve. The first calibration point resets the measured concentration of air to 20.94%. The second calibration point resets the measured concentration of a low concentration calibration gas to its known concentration. This calibration is performed manually. To document the calibration adjustment, the actual measurement at each calibration point prior to adjustment will be recorded.

Following service to the MC3 analyzer that could affect its calibration, each IR channel, and the O<sub>2</sub> analyzer will be calibrated. The CEMS Drift and Calibration Data Sheet in the Appendix to this document will be used to track the cumulative span adjustments (i.e., change in the calibration factor). Section 5.5 of the MC3 CEMS *Operations Guide* and Section 4.4 of the MC3 CEMS *System Guide* should be referred to as needed for additional detail regarding calibration of the CEMS.

If the cumulative calibration adjustment for CD is three times the performance specification limits at any time, hazardous waste burning will be cutoff. The analyzer will be serviced, recalibrated, and an ACA will document that hazardous waste burning can recommence. A calibration factor that has been verified through an ACA will become the new reference point for assessing the cumulative adjustments made to correct for calibration drift.

The incinerator can remain on hazardous waste during CEMS drift checks, calibrations, purges, and corrective actions for CEMS failures provided that the CEMS downtime does not exceed 20 minutes. During these times, the instantaneous values used to determine one-minute averages of dry, oxygen corrected concentrations of CO and HCl are discarded. This allowance is provided by Section 6.2 and 6.5.1 of the Appendix to Subpart EEE. The applicable regulatory requirements do not limit the frequency that this allowance can be utilized. Typically, this allowance will only be utilized once per day for the daily drift checks. Since the oxygen analyzer cannot be calibrated during the automatic calibration of the IR channels, calibration of the oxygen analyzer will require additional downtime. If there is a CEMS failure, the incinerator may remain on hazardous waste provided that the CEMS can be restored within 20 minutes.

Following downtime, the CEMS must be within the performance specifications described in this document. Otherwise, hazardous waste burning will cease until the appropriate corrective measures can be taken. To ensure that the hourly rolling averages (HRAs) for CO and HCl are representative of current operating conditions, CEMS data validity must be at least 75% (i.e., 60 valid one minute averages per 80 minutes of normal operations).

### 2.3 Absolute Calibration Audit

An ACA is conducted quarterly for O<sub>2</sub>, CO (high and low range), and HCl. For O<sub>2</sub> and CO, an ACA is not conducted in the quarter that the required annual RATA is performed. The ACA is conducted according to the calibration error (CE) test procedure described in the Performance Specifications 4B. During the ACA, the analyzer is challenged over each range with EPA Protocol 1 cylinder gases. The EPA Protocol 1 cylinder gases are NIST traceable calibration standards. For a given parameter, the analyzer response is recorded at three measurement points. This is then repeated twice to give three sets of data. The CE at each measurement point is determined as follows:

$$CE = \left| \frac{d}{FS} \right| \cdot 100\%$$

where d is the mean difference between the CEMS response and the known reference concentration and FS is the span value.

For CO and HCl, the CE determined at each measurement point cannot exceed 5%. For O<sub>2</sub>, CE cannot exceed 2%. If an ACA fails to pass the QC criterion (i.e., the audit indicates excessive inaccuracy), then hazardous waste burning cannot resume until corrective measures have been taken and a RATA demonstrates that the CEMS is operating within the performance specifications.

Unless the US EPA specifies performance specifications for HCl CEMS and requires a RATA, an ACA for HCl will be sufficient to ensure HCl data accuracy. A RATA for HCl may be performed annually in lieu of performing an ACA in that quarter.

### 2.4 Interference Response Test

The MC3 analyzer corrects for interferences using additive and multiplicative interference tables. These tables were generated per the manufacturer's procedure at the initial setup of the CEMS system. An Interference Response Test (IRT) is listed in the

Appendix to Subpart EEE, however, the Performance Specification 4B does not include requirements or acceptance criteria for an interference response test. Onyx will perform Interference Response Tests at such time as US EPA specifies the test procedures and acceptable criteria for an Interference Response Test.

## **2.5 Relative Accuracy Test Audit**

The Relative Accuracy Test Audit (RATA) is required annually for O<sub>2</sub> and CO CEMS. The Relative Accuracy (RA) test procedures required by Section 7.2 of PS 4B references incorrect sections of PS 3 (for O<sub>2</sub>) and PS 4A (for CO). The applicable sections of the performance specifications are:

- RATA procedures: Sections 8.4.3 through 8.4.5 of PS 2.
- O<sub>2</sub> reference methods: Section 8.2 of PS 3
- CO reference methods: Section 8.2 of PS 4A.
- O<sub>2</sub> RA calculations: Section 12.0 of PS 3
- CO RA calculations: Section 12.0 of PS 2
- O<sub>2</sub> RA criterion: Section 13.2 of PS 3
- CO RA criteria: Section 13.2 of PS 4A

A brief summary of the applicable reference methods are provided below:

### US EPA Method 3/3A (Stack Gas Composition and Molecular Weight)

The sampling and analytical procedures outlined in this method will be used to determine the O<sub>2</sub> composition of the stack gas during the RATA. Using this method, a gas sample is extracted from the stack at a constant rate for determination of O<sub>2</sub>, CO<sub>2</sub> and molecular weight. The integrated gasbag collection option will be employed. The gasbags will be analyzed using an Orsat analyzer. As an alternative, the Method 3A (instrumental analyzer) method may be used for analysis of the sample.

### US EPA Method 4 (Stack Gas Moisture Content)

If necessary, the sampling and analytical procedures outlined in this method will be used to determine the moisture content of the stack gas during the RATA. Using this method, a gas sample is extracted from the stack. The gas passes through a series of impingers that contain reagents. The impingers are connected in series and are contained in an ice bath in order to assure condensation of the moisture in the gas stream. Any moisture that is not condensed in the impingers is captured in the silica gel, ensuring that all moisture can be weighed and entered into moisture calculations.

### US EPA Method 10 (Carbon Monoxide CEMS)

A continuous emissions monitor will be used to continuously sample exhaust gas for carbon monoxide analysis as described in EPA Method 10. Using this method, a continuous gas sample is extracted from the exhaust gas, and is analyzed for carbon monoxide (CO) using a Luft-type Non-Dispersive Infrared Analyzer (NDIR), or another equivalent analyzer. This sampling and analysis will occur continuously throughout the duration of each run of the RATA.

During a test run of the RATA, US EPA reference methods are utilized to obtain stack gas data. These data are used to calculate the stack gas dry O<sub>2</sub> concentration and the stack gas CO concentration corrected to seven percent oxygen in units of parts per million, dry volume (i.e., in the units of the emission standard, 100 ppm<sub>dv</sub> CO @ 7% O<sub>2</sub>). The average stack gas O<sub>2</sub> (% dry) and CO (ppm<sub>dv</sub>, @ 7% O<sub>2</sub>) concentrations—as calculated from the installed CEMS over the duration of the run—are compared to the value obtained using the reference methods. The RATA consists of a minimum of 9 test runs. If more test runs are conducted, at least 9 data sets will be used to determine RA, and no more than three sets of data will be rejected. The O<sub>2</sub> and CO RA calculations and acceptance criteria are presented below.

$$RA_{\text{oxygen}} = |\bar{d}| \leq 1.0\% \text{ O}_2, \text{ dry}$$

$$RA_{\text{CO}} = \left\{ \begin{array}{l} \frac{|\bar{d}| + |CC|}{\overline{RM}} \cdot 100\% \leq 10\% \dots \text{for } \overline{RM} \geq 50 \text{ ppm}_{dv} @ 7\% \text{ O}_2 \\ |\bar{d}| + |CC| \leq 5 \text{ ppm}_{dv} @ 7\% \text{ O}_2 \dots \text{for } \overline{RM} < 50 \text{ ppm}_{dv} @ 7\% \text{ O}_2 \end{array} \right\}$$

where,

$$\bar{d} = \frac{1}{n} \cdot \sum_{i=1}^n (RM_i - CEMS_i)$$

$n$  = number of test runs

$RM_i$  = the concentration determined by the reference method for the  $i^{\text{th}}$  test run

$CEMS_i$  = the concentration determined by the CEMS for the  $i^{\text{th}}$  test run

$CC$  = the 2.5 percent error confidence coefficient (see Section 12.4 of PS 2)

If a RATA fails to pass the QC criterion (i.e., the audit indicates excessive inaccuracy), then hazardous waste burning cannot resume until corrective measures have been taken and a RATA demonstrates that the CEMS is operating within the performance specifications. If CO emission levels are significantly low, it may be difficult to produce meaningful results using the RA test procedure. Under these circumstances, Onyx will request approval to utilize the Alternative RA Procedure prescribed by Section 7.3 of PS 4B.

### **3.0 CEMS MAINTENANCE**

Onyx has developed a preventative maintenance program for the CEMS. This program includes frequent inspections of the CEMS in order to identify potential component failures, leaks, and data quality issues. The CEMS preventative maintenance program also includes scheduled replacement of critical components and maintenance of spare parts inventory. All scheduled and unscheduled maintenance of the CEMS will be documented in a CEMS logbook maintained for each incinerator. Section 8.0 of the MC3 *CEMS Operations Guide* provides details for daily, weekly, monthly, quarterly, and annual inspection and maintenance activities. Procedures and recordkeeping for the specific inspection and maintenance activities are described below.

#### **3.1 Daily System Audit**

The Daily System Audit includes:

- Review of the daily drift check data
- Inspection of the recording system
- Check for controller alarms and error/warning messages
- Check expected calibration values
- Check of current data status
- Check of calibration gas cylinder pressures
- Check calibration gas pressure regulator settings
- Inspection of the instrument air pressure
- Inspection of the stack gas sampling system

The Daily System Audit Checklist will be used to document the findings from the daily system audit. A CEMS Drift and Calibration Data Sheet will be completed during the daily system audit in order to track and evaluate drift and adjustments made to the CEMS.

#### **3.2 Spare Parts Inventory**

CEMS spare parts are maintained in sufficient quantities on-site to perform routine maintenance activities. It is anticipated that these spare parts and typical maintenance supplies will be adequate to service the CEMS. Some services and replacement of components must be performed by an EcoChem Analytics Service Engineer to avoid violation of the system certification.

The following consumable parts have been targeted for periodic inspection and replacement for maintaining the CEMS:

- Air conditioner filters for CEMS shelter
- Instrument air coalescing filters
- Sample pump Teflon diaphragm
- Sample pump Teflon flapper valve
- Sample probe internal filter
- Sample probe gaskets
- Probe-tip filter

The following spare parts are not part of routine maintenance and would be replaced by an EcoChem Service Engineer:

- Cell front cover gasket
- Cell inlet filter
- Cell windows with o-ring gaskets
- Cell mirrors

The CEMS Calibration Gas and Spare Parts Log is provided in Appendix A and will be used as needed to keep track of inventory.

### **3.3 Calibration Gas Supply and Certification**

A summary of the calibration gases needed to perform the daily drift checks, calibrations, and ACAs is presented in Table 3-1. The number of gas cylinders maintained on-site depends on the specific mixture of gases in each cylinder and the lead time required for placing orders. An inventory of calibration gases will be conducted in conjunction with the spare parts inventory to ensure that the appropriate gases are available for use. Certification from the supplier of calibration gas quality will be kept with the most recent spare parts inventory documentation.

Each calibration sequence depletes approximately 40 psi, and a cylinder with less than 150 psi should be replaced. The daily system audit includes inspection of the calibration gas cylinder pressures and will be used to track usage and to predict when to reorder.

**Table 3-1**  
**Summary of Concentration Requirements for Calibration Gases**

Constituent	QC Parameter	Concentration Requirement	Accuracy
H <sub>2</sub> O	ZD	0%	per gas supplier
O <sub>2</sub>	ZD	0%	per gas supplier
	CD	25%	per gas supplier
	ACA	0-2%	EPA Protocol 1/NIST Traceable
	ACA	8-10%	EPA Protocol 1/NIST Traceable
	ACA	14-16%	EPA Protocol 1/NIST Traceable
CO (low range)	ZD	0 ppm	per gas supplier
	CD	200 ppm	per gas supplier
	ACA	0-40 ppm	EPA Protocol 1/NIST Traceable
	ACA	60-80 ppm	EPA Protocol 1/NIST Traceable
	ACA	140-160 ppm	EPA Protocol 1/NIST Traceable
CO (high range)	ZD	0 ppm	per gas supplier
	CD	3000 ppm	per gas supplier
	ACA	0-600 ppm	EPA Protocol 1/NIST Traceable
	ACA	900-1200 ppm	EPA Protocol 1/NIST Traceable
	ACA	2100-2400 ppm	EPA Protocol 1/NIST Traceable
HCl	ZD	0 ppm	per gas supplier
	CD	1000 ppm	per gas supplier
	ACA	0-200 ppm	EPA Protocol 1/NIST Traceable
	ACA	300-400 ppm	EPA Protocol 1/NIST Traceable
	ACA	700-800 ppm	EPA Protocol 1/NIST Traceable

### 3.4 Corrective Action for Malfunctioning CEMS

It is Onyx's policy to minimize the occurrence of malfunctions by taking a proactive approach to facility maintenance. Proactive measures include the preventive maintenance described in this section, and the calibration and performance testing described in Section 2.0. Frequent inspections and availability of spare parts allow for the timely completion of as needed service to the CEMS prior to a major malfunction.

Operating and maintaining the incinerator during a malfunction will be conformance with the *Startup, Shutdown, and Malfunction Plan* (SSMP). Attachment 4 to the SSMP is the *Program of Corrective Action for Malfunctions*. Section 9.2 of the *Program of Corrective Action for Malfunctions* addresses corrective actions for malfunctioning CEMS. Section 9.0 through 9.2 of the MC3 CEMS *Operations Guide* may be referred to as needed for troubleshooting and corrective maintenance of the CEMS.

#### 4.0. INTEGRATION OF THE CEMS WITH THE AWFCO SYSTEM

The CEMS is integrated with the automatic waste feed cutoff (AWFCO) system to assure on-going compliance with CO and HCl/Cl<sub>2</sub> emission standards. The AWFCO system is designed to immediately and automatically shut off all waste to the incinerator in the event of an exceedance of an emission or operating limit. The CEMS is integrated with AWFCO system through interlocks. These interlocks are conditions which trigger a relay causing the AWFCO system to activate. This section describes the AWFCO interlocks associated with the CEMS.

##### 4.1 Emission Standards

The CEMS raw data for O<sub>2</sub> (% vol), H<sub>2</sub>O (% vol), CO (ppmv), and HCl (ppmv) consists of instantaneous value which have not been smoothed or averaged, evaluated once every 15 seconds. These values are used to calculate CO and HCl emissions in the units of emission standards. Calculations equivalent to the following procedures are performed to compare the stack gas emissions to the CO and HCl emission standards.

First 15-second data in the units of the emission standards are calculated:

$$CO @ 7\% O_2, ppmv = \frac{CO, ppmv}{100\% - (H_2O, \%)} \cdot \left( \frac{14\%}{21\% - \frac{O_2, \%}{100\% - (H_2O, \%)}} \right)$$

$$HCl @ 7\% O_2, ppmv = \frac{HCl, ppmv}{100\% - (H_2O, \%)} \cdot \left( \frac{14\%}{21\% - \frac{O_2, \%}{100\% - (H_2O, \%)}} \right)$$

The HCl emission must be compared to an HCl/Cl<sub>2</sub> emission standard. Onyx has demonstrated through emissions testing that the ratio of HCl to Cl<sub>2</sub> emissions is 15:1. Applying this ratio, the following equation illustrates that a maximum stack gas HCl concentration limit of 68 ppmv @ 7% O<sub>2</sub> is equivalent to the Interim HWC MACT HCl standard of 77 ppmv @ 7% O<sub>2</sub>.

$$\begin{aligned}
\text{HCl/Cl}_2 @ 7\% \text{ O}_2, \text{ppmdv} &= \text{HCl} @ 7\% \text{ O}_2, \text{ppmdv} + 2 \cdot \text{Cl}_2 @ 7\% \text{ O}_2, \text{ppmdv} \\
&= \text{HCl} @ 7\% \text{ O}_2, \text{ppmdv} + 2 \cdot \frac{1}{15} \cdot \text{HCl} @ 7\% \text{ O}_2, \text{ppmdv} \\
&= \frac{17}{15} \text{HCl} @ 7\% \text{ O}_2, \text{ppmdv}
\end{aligned}$$

∴

$$\begin{aligned}
\text{HCl} @ 7\% \text{ O}_2, \text{ppmdv} &= \left( \frac{15}{17} \right) \cdot 77 \text{ppmdv HCl/Cl}_2 @ 7\% \text{ O}_2 \\
&= 68 \text{ppmdv HCl} @ 7\% \text{ O}_2
\end{aligned}$$

The calculated 15-second data are then used to calculate one-minute averages (OMAs). The current minute OMA is averaged with the previous 59 OMAs to generate an hourly rolling average (HRA). All rounding is avoided for the numbers used to calculate HRAs. The HRAs of CO and HCl emissions are rounded to two significant figures.

If the HRA CO emission concentration exceeds the CO emission standard of 100 ppmv @ 7% O<sub>2</sub>, an AWFCO will occur. If the HRA HCl emission concentration exceeds 68 ppmv @ 7% O<sub>2</sub>, an AWFCO will occur.

#### 4.2 Drift Limits

As described in Section 2.1, waste feeds will be manually shut off in case a drift limit is exceeded. For CO and O<sub>2</sub>, drift limits are equal to 2 times the performance specifications. Comparable drift limits have been established for excessive H<sub>2</sub>O and HCl drift.

## 5.0. RECORDKEEPING AND QUALITY ASSURANCE REVIEWS

Documentation generated from CEMS QA/QC procedures and monitoring will be kept on-site for a period of five years. The data and documentation that is generated and reviewed is kept in various locations at the Onyx facility. Table 6-1 below lists the storage location and format of this documentation.

Maintenance and Instrument Technicians have the primary responsibility for creating and organizing CEMS data sheets, daily system audit checklists, maintenance logbook, and spare part inventory records. The Environmental Engineer/Specialist or designee will check these records quarterly to verify completion and organization. This review will also consider the following requirements:

1. Whenever excessive audit inaccuracies occur for two consecutive quarters, the current written procedures will be revised or the CEMS modified or replaced to correct the deficiency causing the excessive inaccuracies. Previous versions of written procedures will be kept on record and made available for inspection.
2. If the ZD and/or CD exceed(s) two times the limits in the Performance Specifications, or if the cumulative adjustment to the ZD and/or CD exceed(s) three times the limits in the Performance Specifications, the CEMS is considered "out-of-control" (as defined in 40 CFR 63.8(c)(7)), and the event will be reported in the facility's semi-annual "Excess Emissions and CMS Performance Report". Further detail on this report can be found in the facility CMS Quality Assurance Program.

On an annual basis the Environmental Engineer/Specialist or designee will review all CEMS data generated for the previous 12 months and prepare a brief internal report/memo summarizing findings. Based on this review, the Environmental Engineer/Specialist or designee will solicit recommendations for revisions to the CEMS Quality Assurance Plan. The CEMS Quality Assurance Plan will be revised as needed to maintain QA/QC of the CEMS. All versions of this plan for the last five years remain in the operating record.

**Table 5-1 CEMS Records and Reports**

<b>Record/Report</b>	<b>Storage Location</b>	<b>Media/Format <sup>1</sup></b>
CEMS QA Plan – Current Version – Previous Version	Incinerator Manager's Office Operating Records Archives	HD and/or P RD
CEMS Readings and HRA – Previous year through year to date – Remaining archives	Data Historian Operating Records Archives	HD and/or RD RD
Drift and Calibration Data: – Previous year through year to date – Remaining archives	Operating Records Archives	P and/or RD
Absolute Calibration Audit – Previous year through year to date – Remaining archives	Operating Record Archives	P and/or RD
Relative Accuracy Test Audit – Previous year through year to date – Remaining archives	Operating Record Archives	P and/or RD
Daily System Audit – Previous year through year to date – Remaining archives	Operating Record Archives	P and/or RD
Preventive Maintenance Logbook – Previous year through year to date – Remaining archives	Operating Records Archives	P and/or RD
Spare Parts Inventory – Previous year through year to date – Remaining archives	Operating Records Archives	P and/or RD
Annual Review of CEMS Data	Operating Records Archives	P and/or HD and/or RD

<sup>1</sup> Media Format:

HD - Computer or network hard drive

RD - Removable drive (floppy, CD, backup tape)

P - Paper documentation

## **6.0 OPERATOR TRAINING AND CERTIFICATION**

Training is provided to Onyx employees on the basis of their job title. Individuals specifically involved in the operation of the incinerator and associated CEMS are the Instrument Technicians, Incinerator Operators, and Environmental Engineer/Specialist. The Onyx operator training and certification program meets the requirements outlined in 40 CFR 63.1206(c)(6). Documentation of employee training and certification is kept with the Training Director, and is available for review upon request.

## **APPENDIX A**

### **CEMS DATA SHEETS AND CHECKLISTS**

NOTE: THE FOLLOWING SHEETS ARE FOR EXAMPLE PURPOSES ONLY.  
ONYX MAY UTILIZE EQUIVALENT DOCUMENTATION FOR ANY OF THE  
SHEETS INCLUDED.

### CEMS DRIFT AND CALIBRATION DATA SHEET

Parameter (Span Value)	Date & Time	Concentration		Drift %	Adjustment %	Cumulative Adjustment %
		Reference	Analyzer			
<b>H<sub>2</sub>O (60 %)</b>						
Zero						
<b>O<sub>2</sub> (25%)</b>						
Zero						
Calibration						
<b>CO (200 ppm)</b>						
Zero						
Calibration						
<b>CO (3000 ppm)</b>						
Zero						
Calibration						
<b>HCl (1000 ppm)</b>						
Zero						
Calibration						

$$\text{Drift \%} = \frac{\text{Reference} - \text{Analyzer}}{\text{Span Value}} \cdot 100\%$$

Adjustment % = Drift % (if zero/span was reset during drift check)

$$\text{Cumulative Adjustment \%} = (\text{Previous Cumulative Adjustment \%}) + (\text{Current Adjustment \%})$$

\_\_\_\_\_

(Name & Title)

\_\_\_\_\_

(Signature)

**ABSOLUTE CALIBRATION AUDIT (ACA)  
DATA SHEET**

<b>Parameter</b>  <input type="checkbox"/> O <sub>2</sub> <input type="checkbox"/> CO-low range <input type="checkbox"/> CO-high range <input type="checkbox"/> HCl	<b>NIST Traceable Calibration Standards</b>		
	<b>Gas</b>	<b>Concentration</b>	
	Low (Zero)		±
	Mid		±
	High		±

RUN NUMBER	Concentration		Difference		
	Reference	Analyzer	Low	Mid	High
1 – Low				--	--
2 – Mid					--
3 – High			--	--	
4 – Low				--	--
5 – Mid			--		--
6 – High			--	--	
7 – Low				--	--
8 – Mid			--		--
9 – High			--		
MEAN DIFFERENCE =					
CALIBRATION ERROR =			%	%	%

$$\text{Calibration Error} = \frac{\text{Mean Difference}}{\text{Span Value}} * 100$$

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)

**RELATIVE ACCURACY TEST AUDIT RATA  
DATA SHEET**

Run	Reference Method			CEMS	Difference	Reference Method			CEMS	Difference
	H <sub>2</sub> O, % (if applicable)	O <sub>2</sub> , % wet (if applicable)	O <sub>2</sub> , % dry	O <sub>2</sub> , % dry	O <sub>2</sub> , % dry	CO ppmv (if applicable)	CO ppmv	CO ppmv @ 7% O <sub>2</sub>	CO ppmv @ 7% O <sub>2</sub>	CO ppmv @ 7% O <sub>2</sub>
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
			O <sub>2</sub> RA						Mean Difference	
									Standard Deviation	
									Confidence Coefficient	
									CO RA	

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)

# CEMS DAILY SYSTEM AUDIT

Initials

Verify that the most recent drift checks and calibration adjustments are within limits. Complete Drift and Calibration Data Sheet. Corrective Actions:	
Verify proper operation of CEMS data recording and printing Corrective Actions:	
Check for controller alarms and error/warning messages Corrective Actions:	
Check expected calibration values Corrective Actions:	
Check current emissions data status Corrective Actions:	
Verify calibration gas cylinder pressures (>150 psi) Corrective Actions:	
Verify pressure regulator settings (approximately 25-35 psi) Corrective Actions:	
Verify proper instrument air pressure to CEMS umbilical Corrective Actions:	
Perform visual inspection of the stack gas sampling system Corrective Actions:	

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Date)

## CEMS CALIBRATION GAS AND SPARE PARTS LOG

### CALIBRATION GASES:

(Attach all certification forms)

Zero gas: \_\_\_\_\_ cylinders Composition: \_\_\_\_\_

Span gas 1: \_\_\_\_\_ cylinders Composition: \_\_\_\_\_

Span gas 2: \_\_\_\_\_ cylinders Composition: \_\_\_\_\_

Span gas 3: \_\_\_\_\_ cylinders Composition: \_\_\_\_\_

ACA Gases: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### PARTS:

Air conditioner filters for CEMS shelter \_\_\_\_\_

Instrument air coalescing filters \_\_\_\_\_

Sample pump Teflon diaphragm \_\_\_\_\_

Sample pump Teflon flapper valve \_\_\_\_\_

Sample probe internal filter \_\_\_\_\_

Sample probe gaskets \_\_\_\_\_

Probe-tip filter \_\_\_\_\_

Cell front cover gasket \_\_\_\_\_

Cell inlet filter \_\_\_\_\_

Cell windows with o-ring gaskets \_\_\_\_\_

Cell mirrors \_\_\_\_\_

Tubing \_\_\_\_\_

Fittings \_\_\_\_\_

Solenoid Valves \_\_\_\_\_

Thermocouples \_\_\_\_\_

Electronic parts \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Other spare parts \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Inventory taken by: \_\_\_\_\_

Date: \_\_\_\_\_

PRELIM  
RESULTS

# SUMMARY OF RESULTS

Incinerator 2 Stack

CO Certification

Corrected to 7% Oxygen

Run Number	Date	Time**	Unit Load MW	Reference Method CO	Monitor Reading CO	Difference CO
1	06/21/04	1918-1948	0 *	0.00 *	0.40 *	-0.40 *
2	06/22/04	0	0	0.00	0.16	-0.16
3	06/22/04	0	0	0.00	0.09	-0.09
4	06/22/04	0	0	0.00	0.12	-0.12
5	06/22/04	0	0	0.00	0.11	-0.11
6	06/22/04	0	0	0.00	0.11	-0.11
7	06/22/04	0	0	0.00	0.13	-0.13
8	06/22/04	0	0	0.00	0.13	-0.13
9	06/22/04	0	0	0.00	0.09	-0.09
10	06/22/04	0	0	1.49	2.01	-0.52
Average			0	0.166	0.328	-0.16

Standard Deviation = 0.136 ppm

Confidence Coefficient = 0.104 ppm

| Mean Difference | + Confidence Coefficient = 0.267 ppm

# SUMMARY OF RESULTS

Incinerator 2 Stack  
Oxygen Monitor  
Relative Accuracy Test Audit

*PRELIM  
RESULTS*

Run Number	Date	Time**	Unit Load MW	Moisture Content %	Reference Method Dry % O2	Reference Method Wet % O2	Monitor Reading % O2	Difference % O2
1	06/21/04	1918-1948	0	40.88	11.22	6.63	11.30	-0.08
2	06/22/04	0935-1005	0	35.17	12.37	8.02	12.19	0.18
3	06/22/04	1020-1050	0	36.35	12.35	7.86	12.08	0.27
4	06/22/04	1108-1137	0	37.81	11.59	7.21	11.74	-0.15
5	06/22/04	1152-1222	0	36.95	12.16	7.67	12.19	-0.03
6	06/22/04	1238-1308	0	38.68	11.15	6.84	11.32	-0.17
7	06/22/04	1323-1353	0	35.74	12.30	7.90	12.57	-0.27
8	06/22/04	1405-1435	0	35.74	12.77	8.21	12.78	-0.01
9	06/22/04	1448-1518	0	36.27	12.33	7.86	12.07	0.26
10	06/22/04	1534-1604	0	34.35	13.14	8.63	12.83	0.31
Avg.			0	36.79	12.14	7.683	12.107	0.031

Standard Deviation = 0.208 % O2

Confidence Coefficient = 0.152 % O2

1Mean Differencel + Confidence Coefficient = 0.183 % O2

PRELIM-  
RESULTS

# SUMMARY OF RESULTS

## Incinerator 2 Stack Carbon Monoxide Monitor Relative Accuracy Test Audit

Run Number	Date	Time**	Unit Load MW	Moisture Content %	Reference Method Dry ppm CO	Reference Method Wet ppm CO	Monitor Reading ppm CO	Difference ppm CO
1	06/21/04	1918-1948	0	40.88	0.0	0.00	0.17	-0.20
2	06/21/04	0935-1005	0	35.17	0.0	0.00	0.07	-0.10
3	06/21/04	1020-1050	0	36.35	0.0	0.00	0.04	0.00
4	06/21/04	1107-1137	0	37.81	0.0	0.00	0.05	-0.10
5	06/21/04	1152-1222	0	36.95	0.0	0.00	0.04	0.00
6	06/21/04	1238-1308	0	38.68	0.0	0.00	0.05	-0.10
7	06/21/04	1323-1353	0	35.74	0.0	0.00	0.05	-0.10
8	06/21/04	1405-1435	0	35.74	0.0	0.00	0.05	-0.10
9	06/21/04	1448-1518	0	36.27	0.0	0.00	0.04	0.00
10	06/21/04	1534-1604	0	34.35	0.8	0.50	0.60	-0.10
Avg.			0	36.79	0.08	0.050	0.116	-0.080

Standard Deviation = 0.063 ppm co

Confidence Coefficient = 0.046 ppm co

|Mean Differencel + Confidence Coefficient = 0.126 ppm co

SUMMARY OF RESULTS  
Incinerator 3 Stack  
CO Certification

*PRELIM  
RESULTS*

Corrected to 7% Oxygen

Run Number	Date	Time**	Unit Load MW	Reference Method CO	Monitor Reading CO	Difference CO
1	06/24/04	956-1026	0	0.00	0.44	-0.44
2	06/22/04	1048-1118	0	0.00	0.00	0.00
3	06/22/04	1128-1148	0	0.00	0.00	0.00
4	06/22/04	1211-1241	0	0.00	0.00	0.00
5	06/22/04	1252-1322	0	0.00	0.00	0.00
6	06/22/04	1335-1405	0	0.00	0.00	0.00
7	06/22/04	1427-1457	0	0.00	0.00	0.00
8	06/22/04	1510-1540	0	0.00	0.00	0.00
9	06/22/04	1556-1626	0	0.00	0.26	-0.26
Average			0	0.000	0.078	-0.08

Standard Deviation = 0.161 ppm

Confidence Coefficient = 0.124 ppm

| Mean Difference | + Confidence Coefficient = 0.201 ppm

# SUMMARY OF RESULTS

PRELIM  
RESULTS

## Incinerator 3 Stack Oxygen Monitor Relative Accuracy Test Audit

Run Number	Date	Time**	Unit Load MW	Moisture Content %	Reference Method Dry % O2	Reference Method Wet % O2	Monitor Reading % O2	Difference % O2
1	06/24/04	956-1026	0 *	36.76 *	12.18 *	7.70 *	10.52 *	1.66 *
2	06/23/04	1048-1118	0	38.21	11.59	7.16	12.69	-1.10
3	06/23/04	1128-1158	0	38.00	11.63	7.21	11.60	0.03
4	06/23/04	1211-1241	0	38.11	11.69	7.23	11.17	0.52
5	06/23/04	1252-1322	0	38.19	11.60	7.17	11.13	0.47
6	06/23/04	1335-1405	0	38.19	11.60	7.17	11.47	0.13
7	06/23/04	1427-1457	0	38.14	11.54	7.14	11.42	0.12
8	06/23/04	1510-1540	0	38.43	11.30	6.96	11.07	0.23
9	06/23/04	1556-1626	0	0.00	11.77	11.77	11.61	0.16
Avg.			0	33.41	11.59	7.726	11.520	0.070

Standard Deviation = 0.503 % O2

Confidence Coefficient = 0.410 % O2

IMean Difference + Confidence Coefficient = 0.480 % O2

# SUMMARY OF RESULTS

*PRELIM  
RESULTS*

## Incinerator 3 Stack Carbon Monoxide Monitor Relative Accuracy Test Audit

Run Number	Date	Time**	Unit Load MW	Moisture Content %	Reference Method Dry ppm CO	Reference Method Wet ppm CO	Monitor Reading ppm CO	Difference ppm CO
1	06/24/04	0956-1026	0	36.76	0.00	0.00	0.21	-0.20
2	06/24/04	1048-1118	0	38.21	0.00	0.00	0.00	0.00
3	06/24/04	1128-1158	0	38.00	0.00	0.00	0.00	0.00
4	06/24/04	1211-1241	0	38.11	0.00	0.00	0.00	0.00
5	06/24/04	1252-1322	0	38.19	0.00	0.00	0.00	0.00
6	06/24/04	1335-1405	0	38.19	0.00	0.00	0.00	0.00
7	06/24/04	1427-1457	0	38.14	0.00	0.00	0.00	0.00
8	06/24/04	1510-1540	0	38.43	0.00	0.00	0.00	0.00
9	06/24/04	1556-1626	0	0.00	0.00	0.00	0.10	-0.10
Avg.			0	33.78	0.00	0.000	0.034	-0.033

Standard Deviation = 0.071 ppm co

Confidence Coefficient = 0.054 ppm co

Mean Difference + Confidence Coefficient = 0.088 ppm co

# SUMMARY OF RESULTS

Incinerator 4 Stack  
Carbon Monoxide Monitor  
Relative Accuracy Test Audit

*PRECIM.  
RESULTS*

Run Number	Date	Time**	Unit Load MW	Moisture Content %	Reference Method Dry ppm CO	Reference Method Wet ppm CO	Monitor Reading ppm CO	Difference ppm CO
1	06/23/04	1004-1034	0	37.27	1.19	0.70	0.65	0.00
2	06/23/04	1125-1155	0	36.31	1.06	0.70	2.03	-1.30
3	06/23/04	1207-1237	0	36.63	1.02	0.60	2.35	-1.80
4	06/23/04	1249-1320	0	35.29	0.75	0.50	0.55	-0.10
5	06/23/04	1347-1417	0 *	0.00 *	0.68 *	0.70 *	0.89 *	-0.20 *
6	06/23/04	1451-1521	0	37.90	0.64	0.40	1.10	-0.70
7	06/23/04	1535-1605	0	33.89	0.61	0.40	0.81	-0.40
8	06/23/04	1621-1651	0	36.79	0.69	0.40	1.72	-1.30
9	06/23/04	1702-1732	0	37.87	0.50	0.30	1.09	-0.80
10	06/23/04	1748-1818	0	36.80	0.83	0.50	1.46	-1.00
Avg.			0	36.53	0.81	0.500	1.306	-0.822

Standard Deviation = 0.595 ppm co

Confidence Coefficient = 0.458 ppm co

|Mean Difference| + Confidence Coefficient = 1.280 ppm co

PRELIM.  
RESULTS

# SUMMARY OF RESULTS

Incinerator 4 Stack

CO Certification

Corrected to 7% Oxygen

Run Number	Date	Time**	Unit Load MW	Reference Method CO	Monitor Reading CO	Difference CO
1	06/23/04	1918-1948	0	1.83	2.08	-0.25
2	06/22/04	0	0	1.65	3.96	-2.31
3	06/22/04	0	0 *	1.74 *	6.57 *	-4.83 *
4	06/22/04	0	0	1.22	1.41	-0.19
5	06/22/04	0	0	1.12	2.22	-1.10
6	06/22/04	0	0	1.02	2.78	-1.76
7	06/22/04	0	0	0.91	1.89	-0.98
8	06/22/04	0	0	1.16	4.22	-3.06
9	06/22/04	0	0	0.77	2.50	-1.73
10	06/22/04	0	0	0.67	3.44	-2.77
Average			0	1.150	2.722	-1.57

Standard Deviation = 1.030 ppm

Confidence Coefficient = 0.792 ppm

| Mean Difference | + Confidence Coefficient = 2.364 ppm

# SUMMARY OF RESULTS

PRELIM.

## Incinerator 4 Stack Oxygen Monitor Relative Accuracy Test Audit

Run Number	Date	Time**	Unit Load MW	Moisture Content %	Reference Method Dry % O2	Reference Method Wet % O2	Monitor Reading % O2	Difference % O2
1	06/23/04	1004-1034	0	37.27	11.78	7.39	12.33	-0.55
2	06/23/04	1125-1155	0 *	36.31 *	11.96 *	7.62 *	9.78 *	2.18 *
3	06/23/04	1207-1237	0	36.63	12.77	8.09	13.27	-0.50
4	06/23/04	1249-1320	0	35.29	12.33	7.98	12.38	-0.05
5	06/23/04	1347-1417	0	0.00	12.43	12.43	12.28	0.15
6	06/23/04	1451-1521	0	37.90	12.15	7.55	12.00	0.15
7	06/23/04	1535-1605	0	33.89	11.61	7.68	11.54	0.07
8	06/23/04	1621-1651	0	36.79	12.62	7.98	12.41	0.21
9	06/23/04	1702-1732	0	37.87	11.86	7.37	11.68	0.18
10	06/23/04	1748-1818	0	36.80	12.39	7.83	12.09	0.30
Avg.			0	32.49	12.22	8.256	12.220	-0.004

Standard Deviation = 0.310 % O2

Confidence Coefficient = 0.239 % O2

Mean Difference + Confidence Coefficient = 0.243 % O2

# Mississippi Lime Company

General Offices

Aiton, Illinois 62002

P.O. Box 247

Phone: 615-453-7741

## MISSISSIPPI ROTARY PLANT

Hydrated Lime

Code MR200

Meets AWWA and Water Chemicals Codex Specifications

### Chemical Analysis

Ca (OH) <sub>2</sub> . . . . .	96.0%	to	97.2%
CaO Equivalent . . . . .	72.6	to	73.6
CaO Total . . . . .	73.6	to	74.3
CaCO <sub>3</sub> . . . . .	0.65	to	1.75
CaSO <sub>4</sub> . . . . .	0.05	to	0.10
S Equivalent . . . . .	0.012	to	0.024
SiO <sub>2</sub> . . . . .	0.38	to	0.65
Al <sub>2</sub> O <sub>3</sub> . . . . .	0.20	to	0.30
Fe <sub>2</sub> O <sub>3</sub> . . . . .	0.07	to	0.10
MgO . . . . .	0.40	to	0.55
Free H <sub>2</sub> O . . . . .	0.30	to	0.95
P <sub>2</sub> O <sub>5</sub> . . . . .	0.008	to	0.012
MnO . . . . .	0.0015	to	0.0025

### Typical Physical Analysis

Minus 100 mesh	100.0%
Minus 200 mesh	98.5
Minus 325 mesh	92.0
Density - Pounds per ft <sup>3</sup> - 20 to 32 (Depending upon degree of compaction)	

**NORIT Americas Inc.**

Most Choices + Precise Fit = Best Performance.

ISO 9002



FM 36335

**DATASHEET**Product No. FGL  
Revised 11-97**DARCO® FGL****POWDERED ACTIVATED CARBON**

DARCO FGL is a lignite coal based activated carbon manufactured specifically for the removal of heavy metals and other contaminants typically found in incinerator flue gas emission streams. Its open pore structure and fine particle size permits the rapid adsorption of gaseous mercury, dioxins (PCDD) and furans (PCDF), which is critical for good absorptive performance in flue gas streams where contact times are short.

DARCO FGL is a free flowing powdered carbon with minimal caking tendencies which makes it ideal for automatic dosing systems with dry or wet injection directly into the flue gas stream. It is manufactured with a very high ignition temperature to permit safe operation at the elevated temperatures inherent in incinerator flue gas streams.

**Specifications**

Molasses decolorizing efficiency, %	40 min.
Moisture, % as packed	8 max.
Mesh size:	
Less than 325 mesh (45 µm), %	90 min.

**General Characteristics\***

Surface area, m <sup>2</sup> /g	550
Heat capacity	0.22
Total sulfur, %	0.6
Ignition temperature, °C	450

\* For general information only, not to be used as purchase specifications.

**Packaging**

Standard package is 40 lb. bags, 50 bags per pallet for a net pallet weight of 2000 lbs. Alternate packages include bulk trailers, and woven polypropylene bulk bags, 900 lbs. net, with a glued plastic liner.

**Safety**

**CAUTION:** Wet activated carbon depletes oxygen from air and, therefore, dangerously low levels of oxygen may be encountered. Whenever workers enter a vessel containing activated carbon, the vessel's oxygen content should be determined and work procedures for potentially low oxygen areas should be followed. Appropriate protective equipment should be worn. Avoid inhalation of excessive carbon dust. No problems are known to be associated in handling this material. However, dust may contain greater than 1.0% silica (quartz). Longterm inhalation of high dust concentrations can lead to respiratory impairment. Use forced ventilation or a dust mask when necessary for protection against airborne dust exposure (see Code of Federal Regulations - Title 29, Subpart Z, par. 1910.1000, Table Z-3).

bulk density 0.63 g/ml  
33 lb/ft<sup>3</sup>

5775 Peachtree Dunwoody Road NE • Building C • Suite 250 • Atlanta, GA 30342  
Telephone (404) 256-6150 • 1-800-641-9245 • FAX (404) 256-6199 www.norit.com



## Solids Residence Time Calculations

### Unit 4:

Based on the equation  $\Theta = [(0.19L)/(NDS)]$ , where:

$\Theta$  is the residence time in minutes,  
L is the kiln length in feet,  
N is the rotational speed in revolutions per minute,  
S is the kiln slope in feet per foot, and  
D is the internal diameter in feet,

and inserting the known values for L (35), N (2), S (0.0174), and D (6.5) result in a residence time for the rotary kiln of 30 minutes.

### Units 2/3:

Since these incinerators are fixed hearth units, residence time is based on the travel length of the ash ram which functions to clear the primary combustion chamber of solid waste residue. A travel length of 110 inches has been determined to be the minimum ash ram stroke length required to remove solid waste residue from the primary combustion chamber of the fixed hearth units.

**MACT TRAINING OUTLINE**  
**ONYX ENVIRONMENTAL SERVICES – SAUGET, IL**

1. Environmental and Safety Requirements for Incineration and Material Handling
  - 1.1 Environmental Regulations for Incineration and Material Handling
  - 1.2 Safety Regulations for Incineration and Material Handling
2. Science and Technology of Incineration and Air Pollution Control
  - 2.1 Combustion
  - 2.2 Heat Exchange
  - 2.3 Refractory
  - 2.4 Acid Gas Neutralization
  - 2.5 Carbon Absorption
  - 2.6 Ash and Particulate Removal
3. Incineration and Air Pollution Control Equipment at Facility
  - 3.1 Combustion Chambers of No. 2 and 3 Incinerators
  - 3.2 Combustion Chambers of No. 4 Incinerator
  - 3.3 Air Pollution Control Equipment of No. 2 and 3 Incinerators
  - 3.4 Air Pollution Control Equipment of No. 4 Incinerator
  - 3.5 Instrumentation and Stack Gas Monitoring
  - 3.6 Process Control and Data Recording Systems

## MACT TRAINING OUTLINE (continued)

4. Incinerator Feed Systems
  - 4.1 Natural Gas Burners
  - 4.2 Bulk Liquids
  - 4.3 Bulk Solids
  - 4.4 Containerized Solids
  - 4.5 Specialty Liquids
  - 4.6 Gases and Liquefied Gases
5. Operation of Facility Incinerators
  - 5.1 Startup and Shutdown – No. 2 and 3 Incinerators
  - 5.2 Startup and Shutdown – No. 4 Incinerator
  - 5.3 Normal Operations
  - 5.4 Processing Scenarios
  - 5.5 Maintenance and Inspection
  - 5.6 Troubleshooting and Response to Process Upsets

Jdm/MACTtrainoutline04

Onyx Environmental Services, L.L.C.

#7 Mobile Avenue  
Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



TRAINING DOCUMENTATION  
FORM

TITLE: MACT OPERATOR TRAINING, PARTS 1 and 2

SUBJECT DESCRIPTION: Review of regulations, incineration science,  
primary combustion and APC equipment at TWI

TRAINING CODE: \_\_\_\_\_ (if uncertain, leave blank)

TRAINING PROVIDED  
BY:

JEFF MUELLER  
(Trainer's name printed)

[Signature]  
(Trainer's signature)

DATE TRAINED:

3-5-03, 3-6-03

LENGTH OF TNG:

16 hours

ATTENDEES:

PRINT NAME:

1. David L Klein
2. Larry Kuilt
3. Terry Ball
4. Michael Dale
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

INPUT TO  
TRS

SIGNATURE

6/18/03

[Signature]  
[Signature]  
[Signature]  
[Signature]

Entered in TRS: \_\_\_\_\_

Onyx Environmental Services, L.L.C.

#7 Mobile Avenue  
Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



TRAINING DOCUMENTATION  
FORM

TITLE: MACT TRAINING FOR INCINERATOR OPERATORS, PARTS 1 AND 2

SUBJECT DESCRIPTION: Review of EHS regulations, science of incineration, and  
primary combustion and APC components of No. 2, No. 3  
and No. 4 Incinerators

TRAINING CODE: \_\_\_\_\_ (if uncertain, leave blank)

TRAINING PROVIDED BY: JEFF MUELLER  
(Trainer's name printed)

[Signature]  
(Trainer's signature)

DATE TRAINED: MARCH 12-13, 2003

LENGTH OF TNG: 16 hours

ATTENDEES:

INPUT TO

TRS 6/18/03

PRINT NAME:	SIGNATURE
1. <u>Clinton Dace</u>	<u>[Signature]</u>
2. <u>Chuck Edwards</u>	<u>[Signature]</u>
3. <u>[Signature]</u>	<u>[Signature]</u>
4. <u>Larry ASKE</u>	<u>[Signature]</u>
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____

Entered in TRS: \_\_\_\_\_

Onyx Environmental Services, L.L.C.

#7 Mobile Avenue  
Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



TRAINING DOCUMENTATION  
FORM

TITLE: MACT INCINERATOR OPERATOR TRAINING - PARTS 1 AND 2

SUBJECT DESCRIPTION: Review of regulations applicable to incineration, science of incineration and primary components for combustion and air pollution control systems

TRAINING CODE: \_\_\_\_\_ (if uncertain, leave blank)

TRAINING PROVIDED BY: JEFF MUELLER  
(Trainer's name printed)

[Signature]  
(Trainer's signature)

DATE TRAINED: MARCH 19-20, 2003

LENGTH OF TNG: 16 hours

ATTENDEES:

PRINT NAME:	SIGNATURE
1. <u>RODNEY J. Maloney</u>	<u>R. J. Maloney</u>
2. <u>George Demetriou</u>	<u>George Demetriou</u>
3. <u>DAVE KLARICH</u>	<u>Dave Klarich</u>
4. <u>Bruce Chandler</u>	<u>Bruce Chandler</u>
5. <u>Ed. LASICH</u>	<u>Edmund R. Lasich</u>
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____

INPUT TO  
TRS 6/18/03

Entered in TRS: \_\_\_\_\_

Onyx Environmental Services, L.L.C.

#7 Mobile Avenue  
Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



TRAINING DOCUMENTATION  
FORM

TITLE:

MACT INCINERATOR OPERATOR TRAINING - PARTS 1 AND 2

SUBJECT  
DESCRIPTION:

Review of EHS regulations, science of incineration and  
main components of combustion and APC systems on  
No. 2, No. 3 and No. 4 Incinerators

TRAINING CODE:

(if uncertain, leave blank)

TRAINING PROVIDED  
BY:

Jeff Mueller  
(Trainer's name printed)

(Trainer's signature)

DATE TRAINED:

March 26-27, 2003

LENGTH OF TNG:

16 hours

ATTENDEES:

PRINT NAME:

1. Tad Schreckenberg
2. Blake Peterson
3. Angelo Demetrias
4. ROBERTA VOELKER

INPUT TO  
TRS

6/18/03  
SIGNATURE

Tad Schreckenberg  
Blake Peterson  
Angelo L. Demetrias  
Robert A. Voelker

5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

Entered in TRS: \_\_\_\_\_

Onyx Environmental Services, L.L.C.

#7 Mobile Avenue  
Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



TRAINING DOCUMENTATION  
FORM

TITLE: MACT INCINERATOR OPERATOR TRAINING - PARTS 1 AND 2

SUBJECT DESCRIPTION: Review of regulations, science of incineration, and main  
components of combustion and APC systems at No. 2,  
No. 3 and No. 4 Incinerators

TRAINING CODE: \_\_\_\_\_ (if uncertain, leave blank)

TRAINING PROVIDED BY: Jeff Mueller  
(Trainer's name printed)

[Signature]  
(Trainer's signature)

DATE TRAINED: April 2-3, 2003

LENGTH OF TNG: 16 hours

ATTENDEES:

PRINT NAME:

1. ROY Underwood
2. DEAN POSTEL
3. DAVID MADESIAN
4. LOUIS A. GARZA
5. STAN LAURENCE
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

INPUT TO  
TRS 6/18/03

SIGNATURE

[Signature]  
[Signature]  
[Signature]  
[Signature]  
[Signature]

Entered in TRS: \_\_\_\_\_

Onyx Environmental Services, L.L.C.

#7 Mobile Avenue  
Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



TRAINING DOCUMENTATION  
FORM

TITLE: MACT OPERATOR TRAINING - PARTS 1 AND 2

SUBJECT DESCRIPTION: Review of regulations, science of incineration,  
and major components of combustion and air pollution control  
systems for No. 2, No. 3 and No. 4 Incinerators.

TRAINING CODE: \_\_\_\_\_ (if uncertain, leave blank)

TRAINING PROVIDED BY: Jeff Mueller  
(Trainer's name printed)

[Signature]  
(Trainer's signature)

DATE TRAINED: APRIL 9-10, 2003

LENGTH OF TNG: 16 hours

INPUT TO

ATTENDEES:

TRS 6/18/03

PRINT NAME:

- |                            |                    |
|----------------------------|--------------------|
| 1. <u>NORMAN J. BRIDER</u> | <u>[Signature]</u> |
| 2. <u>TIM BARRETT</u>      | <u>[Signature]</u> |
| 3. <u>MATT RIGNEY</u>      | <u>[Signature]</u> |
| 4. <u>CHRISTIE NAREZ</u>   | <u>[Signature]</u> |
| 5. <u>GREGG RAINBOLT</u>   | <u>[Signature]</u> |
| 6. <u>GEORGE SMITH</u>     | <u>[Signature]</u> |
| 7. _____                   | _____              |
| 8. _____                   | _____              |
| 9. _____                   | _____              |
| 10. _____                  | _____              |

Entered in TRS: \_\_\_\_\_

**Onyx Environmental Services, L.L.C.**

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Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



**TRAINING DOCUMENTATION  
FORM**

**TITLE:** MACT OPERATOR TRAINING - PARTS 3 and 4

**SUBJECT DESCRIPTION:** Review of incinerator feedingsystems and startup, shutdown,  
normal operations and troubleshooting of incinerators

**TRAINING CODE:** \_\_\_\_\_ (if uncertain, leave blank)

**TRAINING PROVIDED BY:** Jeff Mueller  
(Trainer's name printed)

[Signature]  
(Trainer's signature)

**DATE TRAINED:** 4/16/03 to 4/17/03

**LENGTH OF TNG:** 16 hours

**ATTENDEES:**

PRINT NAME:	SIGNATURE
1. <u>Michael Dale</u>	<u>[Signature]</u>
2. <u>David L Klein</u>	<u>[Signature]</u>
3. <u>Larry Kult</u>	<u>[Signature]</u>
4. <u>Terry Ball</u>	<u>[Signature]</u>
5. <u>GEORGE SMITH</u>	<u>[Signature]</u>
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____

Entered in TRS: \_\_\_\_\_

**Onyx Environmental Services, L.L.C.**

#7 Mobile Avenue  
Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



**TRAINING DOCUMENTATION  
FORM**

**TITLE:** MACT INCINERATOR OPERATOR TRAINING - PARTS 3 & 4

**SUBJECT DESCRIPTION:** REVIEW OF Incinerator burners and Feeding systems, startup,  
shutdown and normal operations of the incinerators, inspection,  
maintenance and troubleshooting

**TRAINING CODE:** \_\_\_\_\_ (if uncertain, leave blank)

**TRAINING PROVIDED BY:** Jeff Mueller  
(Trainer's name printed)

[Signature]  
(Trainer's signature)

**DATE TRAINED:** APRIL 23-24, 2003

**LENGTH OF TNG:** 16 hours

**ATTENDEES:**

PRINT NAME:

1. Tim Frame
2. Chuck Edwards
3. Larry ALVE
4. Clinton Dace
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

**TRS** 6/18/03  
**SIGNATURE**  
[Signature]  
[Signature]

Entered in TRS: \_\_\_\_\_

**Onyx Environmental Services, L.L.C.**

#7 Mobile Avenue  
Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



**TRAINING DOCUMENTATION  
FORM**

**TITLE:** MACT INCINERATOR OPERATOR TRAINING - PARTS 3 AND 4

**SUBJECT DESCRIPTION:** Review of burners and waste feed systems; incinerator operations  
including startup, normal operations, shutdown; inspection, maintenance  
and troubleshooting process upsets.

**TRAINING CODE:** \_\_\_\_\_ (if uncertain, leave blank)

**TRAINING PROVIDED BY:**

Jeff Mueller  
(Trainer's name printed)

[Signature]  
(Trainer's signature)

**DATE TRAINED:** MAY 7-8, 2003

**LENGTH OF TNG:** 16 hours

**ATTENDEES:**

PRINT NAME:

1. Tad Schreckenber
2. Blake Peterson
3. Robert Voelker
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

**INPUT TO**  
**TRS 6/18/03**  
**SIGNATURE**

Tad Schreckenber  
Blake Peterson  
Robert Voelker

Entered in TRS: \_\_\_\_\_

**Onyx Environmental Services, L.L.C.**

#7 Mobile Avenue  
Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



**TRAINING DOCUMENTATION  
FORM**

**TITLE:** MACT INCINERATOR OPERATOR TRAINING - PARTS 3 AND 4

**SUBJECT DESCRIPTION:** Review of burners and waste feed systems; incinerator operations including, startup, normal operations, shutdown; inspection, maintenance and trouble-shooting process upsets.

**TRAINING CODE:** \_\_\_\_\_ (if uncertain, leave blank)

**TRAINING PROVIDED BY:** Jeff Mueller  
(Trainer's name printed)

[Signature]  
(Trainer's signature)

**DATE TRAINED:** MAY 21-22, 2003

**LENGTH OF TNG:** 16 hours

**ATTENDEES:**

**INPUT TO**  
**TRS 6/18/03**

<u>PRINT NAME:</u>	<u>SIGNATURE</u>
1. <u>TIM BARRETT</u>	<u>[Signature]</u>
2. <u>CHRISTIE NAREZ</u>	<u>[Signature]</u>
3. <u>MATT RIBNEY</u>	<u>[Signature]</u>
4. <u>ANGELO G. DEMETRIAS SR</u>	<u>[Signature]</u>
5. <u>NORMAN JACK BRIDEN</u>	<u>[Signature]</u>
6. <u>[Signature]</u>	<u>[Signature]</u>
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____

Entered in TRS: \_\_\_\_\_

**Onyx Environmental Services, L.L.C.**

#7 Mobile Avenue  
Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



**TRAINING DOCUMENTATION  
FORM**

**TITLE:**

MACT OPERATOR TRAINING - PARTS 3 AND 4

**SUBJECT  
DESCRIPTION:**

Review of burners and waste feed systems, incinerator operations  
including startup, shutdown and environmental parameters,  
and troubleshooting process upsets.

**TRAINING CODE:**

(if uncertain, leave blank)

**TRAINING PROVIDED  
BY:**

Jeff Mueller  
(Trainer's name printed)

[Signature]  
(Trainer's signature)

**DATE TRAINED:**

4/30/03 - 5/1/03

**LENGTH OF TNG:**

16 hours

**ATTENDEES:**

**PRINT NAME:**

1. Bruce Chandler

2. Ed Lasich

3. George Demetriou

4. Koib Malaw

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

9. \_\_\_\_\_

10. \_\_\_\_\_

**TRS**

**SIGNATURE**

6/18/03

[Signature]  
Edward B. Lasich  
[Signature]  
R. J. [Signature]

Entered in TRS: \_\_\_\_\_

Onyx Environmental Services, L.L.C.

#7 Mobile Avenue  
Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



TRAINING DOCUMENTATION  
FORM

TNG  
TITLE: MACT NATIONAL EMISSION STANDARDS FOR  
SUBJECT: HAZARDOUS AIR POLLUTANTS FROM HAZARDOUS  
DESCRIPTION: WASTE COMBUSTORS - TRAINING

TRAINING CODE: \_\_\_\_\_ (if uncertain, leave blank)

TRAINING PROVIDED  
BY:

Jeff Mueller  
(Trainer's name printed)

\_\_\_\_\_  
(Trainer's signature)

DATE TRAINED:

1/23/03

LENGTH OF TNG:

1 HR

ATTENDEES:

PRINT NAME:	SIGNATURE
1. <u>David Pratt</u>	<u>[Signature]</u>
2. <u>MARTHA LEAVELL</u>	<u>Martha Leavell</u>
3. <u>Violet Leslee</u>	<u>Violet Leslee</u>
4. <u>MARION SAYRE</u>	<u>Marion Sayre</u>
5. <u>Angie Franke</u>	<u>Angie Franke</u>
6. <u>Douglas Bushey</u>	<u>Douglas Bushey</u>
7. <u>David Klein</u>	<u>David Klein</u>
8. <u>Bruce Chandler</u>	<u>Bruce Chandler</u>
9. <u>STANLEY W. LAWRENCE</u>	<u>Stanley W. Lawrence</u>
10. <u>Vincent Wisely</u>	<u>Vincent Wisely</u>
<u>Scotie Wright</u>	<u>Scotie Wright</u>
<u>Larry Chick</u>	<u>Larry Chick</u>
Entered in TRS: <u>KEVIN BROCK</u>	<u>Kevin Brock</u>

Onyx Environmental Services, L.L.C.

#7 Mobile Avenue  
Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



TRAINING DOCUMENTATION  
FORM

TITLE:

MACT

SUBJECT  
DESCRIPTION:

Haz Waste Combustion

MACT Ins

TRAINING CODE:

(if uncertain, leave blank)

TRAINING PROVIDED  
BY:

JEFF MUELLER

(Trainer's name printed)

(Trainer's signature)

DATE TRAINED:

2/3/03

LENGTH OF TNG:

1 1/2 hr

ATTENDEES:

PRINT NAME:

SIGNATURE

1. TIM BARRETT

Tim Barrett

2. Tony Sackett

Anthony Sackett

3. JACK FICKER

Jack Ficker

4. Randy Portell

Randy Portell

5. Don JOHNSTON

Don Johnston

6. JOHN STREMPER

John Stremper

7. Jack Ceynowa

Jack Ceynowa

8. Steve Becken

Steve Becken

9. Rob Brown

Rob Brown

10. Rod E. DENT

Rod E. Dent

Steve Lut #1

Steve Lut #1

Entered in TRS:

Onyx Environmental Services, L.L.C.

#7 Mobile Avenue  
Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



TRAINING DOCUMENTATION  
FORM

TITLE:

MACT

SUBJECT  
DESCRIPTION:

HAZ WASTE COMBUSTOR

MACT TRNG

TRAINING CODE:

(if uncertain, leave blank)

TRAINING PROVIDED  
BY:

JEFF MUELLER

(Trainer's name printed)

(Trainer's signature)

DATE TRAINED:

2/3/03

LENGTH OF TNG:

1 1/2 hr

ATTENDEES:

PRINT NAME:

SIGNATURE

1. Michael L. McClellan

Michael L. McClellan

2. Todd Hale

Todd Hale

3. MITCHELL A. BLUM

Mitchell A. Blum

4. Dave Cripps

Dave Cripps

5. Kenny Jato

Kenny Jato

6. Scott Ernst

Scott Ernst

7. Bill Adams

Bill Adams

8. John Strame

John Strame

9. Chad Schreckenberg

Chad Schreckenberg

10. Tad Schreckenberg

Tad Schreckenberg

Entered in TRS: \_\_\_\_\_

Onyx Environmental Services, L.L.C.

#7 Mobile Avenue  
Sauget, IL 62201  
(618) 271-2804  
(618) 271-2128 FAX



TRAINING DOCUMENTATION  
FORM

TITLE:

HAZARDOUS WASTE COMBUSTOR MACT  
TRAINING.

SUBJECT  
DESCRIPTION:

INITIAL TRAINING

TRAINING CODE:

(if uncertain, leave blank)

TRAINING PROVIDED  
BY:

JEFF MUELLER  
(Trainer's name printed)

(Trainer's signature)

DATE TRAINED:

2/8/03

LENGTH OF TNG:

1 1/2 hr.

ATTENDEES:

PRINT NAME:	SIGNATURE
1. Gary Buche	
2. Arnold Henry	
3. Angelo Demetralias	
4. Bob Kain	
5. ROB SANDRETTO	
6. Bruce McGlaxon	
7. Doug Hall	
8. RICH PRATT	
9. John Anderson	
10. WAYNE DEMETRALIAS	

Entered in TRS: \_\_\_\_\_

**B**



---

**ONYX ENVIRONMENTAL SERVICES  
SAUGET, IL**

**NOTIFICATION OF COMPLIANCE  
NATIONAL EMISSION STANDARDS FOR  
HAZARDOUS AIR POLLUTANTS FROM  
HAZARDOUS WASTE COMBUSTORS  
40 CFR PART 63, SUBPART EEE  
SEPTEMBER 28, 2005**

---

Onyx Environmental Services, L.L.C.  
#7 Mobile Avenue, Sauget, IL 62201  
(618) 271-2804  
[www.onyxes.com](http://www.onyxes.com)



## HWC MACT Emission Standards

<u>Parameter</u>	<u>Units</u>	<u>Standard</u>	<u>Method of Compliance</u>
Dioxin/Furan (D/F)	ng/dscm TEQ	0.20	Operating Parameter Limits
Mercury (Hg) *	ug/dscm	130	Operating Parameter Limits
Semivolatile Metals (SVM) Cadmium, Lead *	ug/dscm	240	Operating Parameter Limits
Low Volatile Metals (LVM) Arsenic, Beryllium, Chromium *	ug/dscm	97	Operating Parameter Limits
Carbon Monoxide (CO)	ppmv	100	Continuous Emissions Monitor
Hydrogen Chloride/Chlorine (HCl/Cl <sub>2</sub> )	ppmv	77	Continuous Emissions Monitor
Particulate	mg/dscm	34	Operating Parameter Limits

\* Based on incinerator performance testing results for emissions of the three metals classifications, feed limitations for Hg, SVM, and LVM have been linearly extrapolated to a level equivalent to eighty percent of the respective emission standard.

### UNITS 2/3 OPERATING PARAMETERS

<u>Operating Parameter</u>	<u>Units</u>	<u>Limits</u>	<u>Data in Lieu Test</u>	<u>Performance Standards</u>
Maximum Total Pumpable Waste (Hourly Rolling Total)	Lb/hr	3123	May, 2004	DRE, D/F
Maximum Total Hazardous Waste (Hourly Rolling Total)	Lb/hr	4301	May, 2004	DRE, D/F
Maximum Stack Gas Flow Rate (Hourly Rolling Average)	Acfm	15,534	Sept., 2003	DRE, D/F, Part., SVM, LVM
Minimum Primary Combustion Chamber Temperature (Hourly Rolling Average)	Deg F	1712	May, 2004	DRE, D/F
Minimum Secondary Combustion Chamber Temperature (Hourly Rolling Average)	Deg F	1845	Test Report from 1/21/97	DRE, D/F
Maximum Baghouse Inlet Temperature (Hourly Rolling Average)	Deg F	420	May, 2004	D/F, SVM, LVM
Maximum Low Volatile Metals Feedrate (12 Hour Rolling Total)	Lb/hr	1264	Sept., 2003	LVM
Maximum Semi Volatile Metals Feedrate (12 Hour Rolling Total)	Lb/hr	3477	Sept., 2003	SVM
Maximum Mercury Feed rate (12 Hour Rolling Total)	Lb/hr	0.0073	May, 2004	Hg
Maximum Chlorine Feed rate (12 Hour Rolling Total)	Lb/hr	237	Test Report from 1/21/97	SVM, LVM
Maximum Ash Feed Rate (12 Hour Rolling Total)	Lb/hr	673	Test Report from 1/21/97	Part.

#### UNIT 4 OPERATING PARAMETERS

<u>Operating Parameter</u>	<u>Units</u>	<u>Limits</u>	<u>Data in Lieu Test</u>	<u>Performance Standards</u>
Maximum Total Pumpable Waste (Hourly Rolling Total)	Lb/hr	4262	Sept., 2003 Cond. 1	DRE, D/F
Maximum Total Hazardous Waste (Hourly Rolling Total)	Lb/hr	14,802	Sept., 2003 Cond. 1	DRE, D/F
Maximum Stack Gas Flow Rate (Hourly Rolling Average)	Acfm	43,900	Sept., 2003 Cond. 1	DRE, D/F, Part., SVM, LVM
Minimum Primary Combustion Chamber Temperature (Hourly Rolling Average)	Deg F	1507	Sept., 2003 Cond. 1	DRE, D/F
Minimum Secondary Combustion Chamber Temperature (Hourly Rolling Average)	Deg F	1886	Sept., 2003 Cond. 1	DRE, D/F
Maximum Baghouse Inlet Temperature (Hourly Rolling Average)	Deg F	435	Sept., 2003 Cond. 1	D/F, SVM, LVM
Maximum Low Volatile Metals Feedrate (12 Hour Rolling Total)	Lb/hr	120	Sept., 2003 Cond. 1	LVM
Maximum Semi Volatile Metals Feedrate (12 Hour Rolling Total)	Lb/hr	117	Sept., 2003 Cond. 1	SVM
Maximum Mercury Feed rate (12 Hour Rolling Total)	Lb/hr	0.067	May, 2004	Hg
Maximum Chlorine Feed rate (12 Hour Rolling Total)	Lb/hr	274	Sept., 2003 Cond. 1	SVM, LVM
Maximum Ash Feed Rate (12 Hour Rolling Total)	Lb/hr	8777	Test Report from 2/22/96	Part.
Carbon Injection Feedrate (Hourly Rolling Average)	Lb/hr	6	May, 2004	D/F, Hg

**FIXED HEARTH INCINERATOR  
TEST RESULTS  
UNITS 2/3**

Table 2-1. Summary of Results—Emissions Performance

Parameter	Units	Run 1	Run 2	Run 3
DRE-carbon tetrachloride	%	99.99991	99.99997	99.99997
DRE-tetrachloroethene	%	99.99993	99.99997	99.99998
DRE-1,2,3-trichlorobenzene	%	>99.99985	>99.99984	>99.99983
Particulate matter (corrected to 7% O <sub>2</sub> )	gr/dscf	0.0017	0.0004	0.0009
HCl emissions	lb/hr	0.435	0.517	0.274
HCl removal efficiency	%	99.81	99.80	99.88
Cl <sub>2</sub> emissions	lb/hr	0.006	0.008	0.007
Oxygen <sup>a</sup>	%	10.2	9.5	10.4
Carbon dioxide <sup>a</sup>	%	7.4	7.7	7.3
Total hydrocarbons <sup>b</sup>	ppm	0	0	0.4
Nitrogen oxides <sup>b</sup>	ppm	114	105	101
Carbon monoxide <sup>b</sup>	ppm	0.6	1.7	0.8

<sup>a</sup> Average Orsat measurements, dry basis.

<sup>b</sup> MRI continuous monitor, average of 1-minute readings. Results are dry basis, except for THC which was a heated THC and is therefore wet basis.

**Table 2-6 Summary of Metals Emissions for Unit 2 –Target Metals**

<b>Low Volatile Metals Emissions - micrograms/m<sup>3</sup></b>				
<b>Metals</b>	<b>Run1</b>	<b>Run2</b>	<b>Run3</b>	<b>Average</b>
As	1.4	1.5	0.63	1.2
Be	<0.22	<0.21	<0.20	<0.21
Cr	1.14	1.27	1.50	1.30
Total LVM	<2.7	<3.0	<2.3	<2.7
LVM Regulatory Standard = 97 micrograms/m <sup>3</sup>				
<b>Semi-Volatile Metal Emissions - micrograms/m<sup>3</sup></b>				
<b>Metals</b>	<b>Run1</b>	<b>Run2</b>	<b>Run3</b>	<b>Average</b>
Pb	2.9	4.0	3.8	3.5
Cd	0.22	0.19	0.10	0.17
Total SVM	3.1	4.2	3.9	3.7
SVM Regulatory Standard = 240 micrograms/m <sup>3</sup>				

Table 2-6, Continued Summary of Metals Emissions for Unit 2

Run No.		Run 1	Run 2	Run 3	
Date		18-Sep-03	19-Sep-03	19-Sep-03	
Start Time	Units	1445	830	1250	
Stop Time		1810	1112	1531	AVGS
<b>Sampling Parameters --</b>					
Barometric Pressure	in. Hg	29.55	29.60	29.60	29.58
Volume Metered	dscf	85.391	84.763	82.288	84.147
Sample Volume	dscf	78.120	83.405	79.852	80.459
Moisture	% v/v	44.5	42.4	43.4	43.4
O <sub>2</sub> at Stack	% dry	12.10	12.10	11.50	11.90
Avg. Stack Temp.	*F	382	368	372	374
Stack Flowrate	dscfm	5,381	5,840	5,549	5,590
Isokinetics	%	99	97	98	98
<b>Arsenic (As) --</b>					
Quantity Collected	LVM µg	1.90	2.30	0.96	1.72
Stack Conc. @ 7% O <sub>2</sub>	µg/m <sup>3</sup>	1.35	1.53	0.63	1.17
Stack Emission Rate	lb/hr	1.73E-05	2.13E-05	8.82E-06	1.58E-05
<b>Beryllium (Be) --</b>					
Quantity Collected	LVM µg	< 0.31	< 0.31	< 0.31	< 0.31
Stack Conc. @ 7% O <sub>2</sub>	µg/m <sup>3</sup>	< 0.22	< 0.21	< 0.20	< 0.21
Stack Emission Rate	lb/hr	2.82E-06	< 2.87E-06	< 2.85E-06	< 2.85E-06
<b>Total Chromium (Cr) --</b>					
Quantity Collected	LVM µg	1.60	1.90	2.30	1.93
Stack Conc. @ 7% O <sub>2</sub>	µg/m <sup>3</sup>	1.14	1.27	1.50	1.30
Stack Emission Rate	lb/hr	1.46E-05	1.76E-05	2.11E-05	1.78E-05
<b>Cadmium (Cd) --</b>					
Quantity Collected	SVM µg	0.31	0.28	0.16	0.25
Stack Conc. @ 7% O <sub>2</sub>	µg/m <sup>3</sup>	0.22	0.19	0.10	0.17
Stack Emission Rate	lb/hr	2.82E-06	2.59E-06	1.47E-06	2.30E-06
<b>Lead (Pb) --</b>					
Quantity Collected	SVM µg	4.01	6.01	5.81	5.28
Stack Conc. @ 7% O <sub>2</sub>	µg/m <sup>3</sup>	2.85	4.00	3.79	3.55
Stack Emission Rate	lb/hr	3.65E-05	5.57E-05	5.34E-05	4.85E-05

**Table 2-1 ONYX Fixed Hearth Incinerator Unit 2 PCDD/PCDF Emission Results –  
TOTAL TEQ's**

	Run No.	Run 1		Run 3		Run 4	
	Date	05-May-04		06-May-04		06-May-04	
	Start Time	09:35		10:10		14:15	
	Stop Time	12:38		13:30		17:23	
	Units						
Sample Volume	dscf	125.482		126.931		128.302	
Sample Volume	m <sup>3</sup>	3.55		3.59		3.63	
Moisture Content	% v/v	43.0		44.7		43.4	
O <sub>2</sub> Concentration	% v/v (dry)	10.40		10.50		10.50	
CO <sub>2</sub> Concentration	% v/v (dry)	4.50		4.20		4.30	
Isokinetics	%	102		105		102	
Stack Flowrate	dscfm	5,747		5,564		5,776	
PCDD / PCDF Parameters	TEF (a)	pg	ng/m <sup>3</sup> TEQ	pg	ng/m <sup>3</sup> TEQ	pg	ng/m <sup>3</sup> TEQ
2,3,7,8-TCDD	1.00	5.16	1.5E-03	(6.47)	0.0E+00	5.33	1.5E-03
1,2,3,7,8-PeCDD	0.50	34.2	4.8E-03	33.5	4.7E-03	20.3	2.8E-03
1,2,3,4,7,8-HxCDD	0.10	31.7	8.9E-04	27.8	7.7E-04	19.7	5.4E-04
1,2,3,6,7,8-HxCDD	0.10	87.2	2.5E-03	62.5	1.7E-03	44.3	1.2E-03
1,2,3,7,8,9-HxCDD	0.10	46.4	1.3E-03	56.6	1.6E-03	35.7	9.8E-04
1,2,3,4,6,7,8-HpCDD	0.01	437.6	1.2E-03	287	8.0E-04	166.0	4.6E-04
OCDD	0.001	368.6	1.0E-04	222.2	6.2E-05	135.1	3.7E-05
2,3,7,8-TCDF	0.10	50.0	1.4E-03	64.3	1.8E-03	45.6	1.3E-03
1,2,3,7,8-PeCDF	0.05	72.7	1.0E-03	68.3	9.5E-04	41.8	5.8E-04
2,3,4,7,8-PeCDF	0.50	153.0	2.2E-02	166.0	2.3E-02	88.0	1.2E-02
1,2,3,4,7,8-HxCDF	0.10	116.0	3.3E-03	85.8	2.4E-03	48.2	1.3E-03
1,2,3,6,7,8-HxCDF	0.10	85.5	2.4E-03	63.3	1.8E-03	36.4	1.0E-03
2,3,4,6,7,8-HxCDF	0.10	226.0	6.4E-03	151.0	4.2E-03	71.1	2.0E-03
1,2,3,7,8,9-HxCDF	0.10	52.1	1.5E-03	32.0	8.9E-04	18.5	5.1E-04
1,2,3,4,6,7,8-HpCDF	0.01	220.0	6.2E-04	131.0	3.6E-04	64.4	1.8E-04
1,2,3,4,7,8,9-HpCDF	0.01	69.6	2.0E-04	21.6	6.0E-05	(14.4)	0.0E+00
OCDF	0.001	120.0	3.4E-05	45.9	1.3E-05	31.4	8.6E-06
<b>TOTAL TEQs (ng/m<sup>3</sup>)</b>	=	0.051			0.045		0.026
<b>TOTAL TEQs (ng/m<sup>3</sup> @ 7 % O<sub>2</sub>)</b>	=	0.067			0.060		0.035
<b>TOTAL TEQs (g/s)</b>	=	1.4E-10			1.2E-10		7.2E-11

(a) U.S.EPA (1989) Toxic Equivalency Factor

Note: "Non-detect" values are shown in parentheses and treated as zero in the calculation of concentration on a TEQ basis.

**Table 2-4 ONYX Rotary Kiln Unit 2 Mercury Emission Results**

Run No. Date Start Time Stop Time	Units	Run 1 05-May-04 9:35 12:11	Run 3 06-May-04 10:10 13:00	Run 4 06-May-04 14:15 16:53	AVGS
<b><u>Sampling Parameters —</u></b>					
Barometric Pressure	in. Hg		29.55	29.55	29.52
Volume Metered	dcf	80.781	90.379	92.516	87.892
Sample Volume	dscf	74.587	82.730	83.260	80.192
Moisture	% v/v	44.5	45.6	44.4	44.8
O <sub>2</sub> at Stack	% dry	10.40	10.50	10.50	10.47
Avg. Stack Temp.	°F	364	370	371	368
Stack Flowrate	dscfm	5,112	5,565	5,709	5,462
Isokinetics	%	100	102	100	101
<b><u>Mercury (Hg) —</u></b>					
Quantity Collected	VM µg	25.3	23.8	19.6	22.9
Stack Conc. @ 7% O <sub>2</sub>	µg/m <sup>3</sup>	15.8	13.5	11.1	13.5
Stack Emission Rate	lb/hr g/sec	2.29E-04 2.89E-05	2.12E-04 2.67E-05	1.78E-04 2.24E-05	2.06E-04 2.60E-05

**ROTARY KILN INCINERATOR  
TEST RESULTS  
UNIT 4**

Table 2-1. Summary of Results—Emissions Performance

Parameter	Units	Run 1	Run 2	Run 3
Date	—	12/5/95	12/6/95	12/7/95
DRE-monochlorobenzene	%	99.99988	99.99986	99.99983
DRE-hexachloroethane	%	> 99.99981	> 99.99984	> 99.99984
DRE-naphthalene	%	> 99.99989	> 99.99990	> 99.99990
Particulate matter (uncorrected)	gr/dscf	0.0037	0.0056	0.0050
Particulate matter (corrected to 7% O <sub>2</sub> )	gr/dscf	0.0057	0.0087	0.0078
HCl emissions	lb/hr	1.86	1.34	1.38
HCl removal efficiency	%	99.82	99.77	99.79
Cl <sub>2</sub> emissions	lb/hr	< 0.01	< 0.01	< 0.01
Oxygen <sup>a</sup>	%	7.0	7.1	6.9
Carbon dioxide <sup>a</sup>	%	12.0	12.1	12.0
Total hydrocarbons <sup>b</sup>	ppm	< 1	< 1	< 1
Nitrogen oxides <sup>b</sup>	ppm	118	105	219
Carbon monoxide <sup>b</sup>	ppm	0	< 1	< 1

<sup>a</sup> Orsat measurements, dry basis.

<sup>b</sup> MRI continuous monitor, average of 1-minute readings. Results are dry basis, except for THC which was a heated THC and is therefore wet basis.

**Table 2-2 Summary of Metals Emissions for Unit 4, Condition 1 –Target Metals**

<b>Low Volatile Metals Emissions - micrograms/m<sup>3</sup></b>				
<b>Metals</b>	<b>Run1</b>	<b>Run2</b>	<b>Run3</b>	<b>Average</b>
As	35.7	21.3	15.2	24.1
Be	<0.19	<0.19	<0.19	<0.19
Cr	6.07	8.92	5.26	6.75
Total LVM	<42.0	<30.4	<20.7	<31.0
LVM Regulatory Standard = 97 micrograms/m <sup>3</sup>				
<b>Semi-Volatile Metal Emissions - micrograms/m<sup>3</sup></b>				
<b>Metals</b>	<b>Run1</b>	<b>Run2</b>	<b>Run3</b>	<b>Average</b>
Pb	135.8	253.7	202.8	197.4
Cd	2.54	1.15	0.32	1.33
Total SVM	138.3	254.8	203.1	198.7
SVM Regulatory Standard = 240 micrograms/m <sup>3</sup>				

Table 2-2, Continued Summary of Metals Emissions for Unit 4 Condition 1

Run No.		U4-C1-R1	U4-C1-R2	U4-C1-R3	
Date		16-Sep-03	16-Sep-03	17-Sep-03	
Start Time	Units	1015	1645	800	
Stop Time		1309	1923	1039	AVGS
<b>Sampling Parameters –</b>					
Barometric Pressure	in. Hg	29.70	29.70	29.70	29.70
Volume Metered	dcf	108.713	105.734	99.986	104.811
Sample Volume	dscf	100.851	99.059	96.247	98.719
Moisture	% v/v	38.8	39.1	39.4	39.1
O <sub>2</sub> at Stack	% dry	13.00	13.00	12.70	12.90
Avg. Stack Temp.	°F	409	407	401	405
Stack Flowrate	dscfm	18,757	18,563	18,813	18,711
Isokinetics	%	104	103	99	102
<b>Arsenic (As) –</b>					
Quantity Collected	LVM µg	58.30	34.10	24.60	39.00
Stack Conc. @ 7% O <sub>2</sub>	µg/m <sup>3</sup>	35.73	21.27	15.22	24.07
Stack Emission Rate	lb/hr	1.43E-03	8.45E-04	6.36E-04	9.72E-04
<b>Beryllium (Be) –</b>					
Quantity Collected	LVM µg	< 0.31	< 0.31	< 0.31	< 0.31
Stack Conc. @ 7% O <sub>2</sub>	µg/m <sup>3</sup>	< 0.19	< 0.19	< 0.19	< 0.19
Stack Emission Rate	lb/hr	7.63E-06	< 7.68E-06	< 8.01E-06	< 7.78E-06
<b>Total Chromium (Cr) –</b>					
Quantity Collected	LVM µg	9.90	14.30	8.50	10.90
Stack Conc. @ 7% O <sub>2</sub>	µg/m <sup>3</sup>	6.07	8.92	5.26	6.75
Stack Emission Rate	lb/hr	2.44E-04	3.54E-04	2.20E-04	2.73E-04
<b>Cadmium (Cd) –</b>					
Quantity Collected	SVM µg	4.14	1.84	0.51	2.16
Stack Conc. @ 7% O <sub>2</sub>	µg/m <sup>3</sup>	2.54	1.15	0.32	1.33
Stack Emission Rate	lb/hr	1.02E-04	4.56E-05	1.32E-05	5.35E-05
<b>Lead (Pb) –</b>					
Quantity Collected	SVM µg	221.61	406.61	327.61	318.61
Stack Conc. @ 7% O <sub>2</sub>	µg/m <sup>3</sup>	135.80	253.67	202.75	197.41
Stack Emission Rate	lb/hr	5.45E-03	1.01E-02	8.47E-03	8.00E-03

Table 2-1 Summary of PCDD/PCDF Emissions for Unit 4, Condition 1, TEQ Basis

	Run No.	C1-R1		C1-R2		C1-R3	
	Date	16-Sep-03		16-Sep-03		17-Sep-03	
	Start Time	1015		1645		800	
	Stop Time	1353		1953		1109	
	Units						
Sample Volume	dscf	126.784		117.634		114.383	
Sample Volume	m³	3.59		3.33		3.24	
Moisture Content	% v/v	37.9		39.8		40.0	
O₂ Conc.	% v/v (dry)	13.00		13.00		12.70	
CO₂ Conc.	% v/v (dry)	5.00		5.20		5.50	
Isokinetics	%	102		102		99	
Stack Flowrate	dscfm	18,879		18,796		18,797	
PCDD / PCDF Parameters	TEF (a)	pg/sample	ng/m TEQ²	pg/sample	ng/m²TEQ	pg/sampl	ng/m²TEQ
2,3,7,8-TCDD	1.00	8	2.3E-03	13	3.9E-03	12	3.7E-03
1,2,3,7,8-PeCDD	0.50	42	5.8E-03	35	5.3E-03	27	4.2E-03
1,2,3,4,7,8-HxCDD	0.10	45	1.2E-03	44	1.3E-03	31	9.6E-04
1,2,3,6,7,8-HxCDD	0.10	59	1.7E-03	66	2.0E-03	45	1.4E-03
1,2,3,7,8,9-HxCDD	0.10	49	1.4E-03	35	1.0E-03	28	8.7E-04
1,2,3,4,6,7,8-HpCDD	0.01	264	7.3E-04	249	7.5E-04	157	4.8E-04
OCDD	0.00	225	6.3E-05	189	5.7E-05	150	4.6E-05
2,3,7,8-TCDF	0.10	30	8.2E-04	28	8.4E-04	24	7.3E-04
1,2,3,7,8-PeCDF	0.05	50	7.0E-04	30	4.5E-04	27	4.2E-04
2,3,4,7,8-PeCDF	0.50	61	8.6E-03	46	6.9E-03	39	6.1E-03
1,2,3,4,7,8-HxCDF	0.10	101	2.8E-03	50	1.5E-03	31	9.5E-04
1,2,3,6,7,8-HxCDF	0.10	98	2.7E-03	42	1.3E-03	29	9.0E-04
2,3,4,6,7,8-HxCDF	0.10	102	2.8E-03	47	1.4E-03	32	9.8E-04
1,2,3,7,8,9-HxCDF	0.10	25	7.0E-04	18	5.4E-04	16	4.9E-04
1,2,3,4,6,7,8-HpCDF	0.01	463	1.3E-03	139	4.2E-04	104	3.2E-04
1,2,3,4,7,8,9-HpCDF	0.01	100	2.8E-04	26	7.9E-05	16	4.9E-05
OCDF	0.00	320	8.9E-05	59	1.8E-05	69	2.1E-05
TOTAL TCDD	0.00	1,366	0.0E+00	1,451	0.0E+00	910	0.0E+00
TOTAL PeCDD	0.00	1,417	0.0E+00	1,510	0.0E+00	1,019	0.0E+00
TOTAL HxCDD	0.00	1,542	0.0E+00	1,648	0.0E+00	1,000	0.0E+00
TOTAL HpCDD	0.00	557	0.0E+00	512	0.0E+00	336	0.0E+00
TOTAL TCDF	0.00	3,526	0.0E+00	4,457	0.0E+00	3,149	0.0E+00
TOTAL PeCDF	0.00	846	0.0E+00	801	0.0E+00	519	0.0E+00
TOTAL HxCDF	0.00	895	0.0E+00	394	0.0E+00	238	0.0E+00
TOTAL HpCDF	0.00	842	0.0E+00	180	0.0E+00	147	0.0E+00
TOTAL TEQs (ng/m³)	=		0.03		0.03		0.02
TOTAL TEQs (ng/m³ @ 7 % O₂)	=		0.06		0.05		0.04
TOTAL TEQs (g/s)	=		3.0E-10		2.5E-10		2.0E-10

(a) U.S.EPA (1989) Toxic Equivalency Factor

Table 2-5 ONYX Fixed Hearth Incinerator Unit 4 Mercury Emission Results

Run No. Date Start Time Stop Time	Units	Run 1 5/4/2004 8:45 10:46	Run 3 5/4/2004 12:32 14:33	Run 4 5/4/2004 14:48 16:49	AVGS
<b><u>Sampling Parameters --</u></b>					
Barometric Pressure	in. Hg		29.45	29.45	29.45
Volume Metered	dcf	81.633	79.633	78.466	79.911
Sample Volume	dscf	78.146	74.416	73.498	75.353
Moisture	% v/v	42.0	41.7	42.9	42.2
O <sub>2</sub> at Stack	% dry	12.90	12.80	12.80	12.83
Avg. Stack Temp.	°F	384	392	393	390
Stack Flowrate	dscfm	17,708	17,788	17,828	17,775
Isokinetics	%	106	100	99	102
<b><u>Mercury (Hg) --</u></b>					
Quantity Collected	VM µg	8.4	22.2	35.5	22.1
Stack Conc. @ 7% O <sub>2</sub>	µg/m <sup>3</sup>	6.6	18.0	29.1	17.9
Stack Emission Rate	lb/hr g/sec	2.53E-04 3.19E-05	7.03E-04 8.86E-05	1.14E-03 1.43E-04	6.98E-04 8.80E-05

Onyx Comprehensive Performance Test Plan

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## 2.0 INCINERATOR PROCESS DESCRIPTION

### 2.1 Process Overview

This section presents a summary description of the OES incinerators in operation at the Sauget, IL facility. A Process Flow Diagram (PFD) for each incinerator is provided in Appendix A of this Plan.

Onyx Environmental Services (OES) operates 2 Fixed Hearth Dual Chambered Incinerators (Units 2 and 3) and one rotary kiln (Unit 4) at the Sauget, IL facility. The two fixed hearth units are rated at 16 million Btu/hr each. Incineration Unit No. 3 is a mirror image of Unit No. 2. Both of these units have their own waste handling systems as described in the sections that follow. The only difference being Unit No. 2 is equipped with four (4) baghouse modules, while Unit No. 3 is equipped with three (3) baghouse modules. Unit 4 is rated at 50 million Btu/hr and is equipped with its own tank farm system, drum storage, bulk solids storage and feed systems.

### 2.2 Waste Feed Systems [40 CFR §63.1207(f)(1)(iii)(D)(E) and (f)(1)(ii)(C)]

#### 2.2.1 Units 2 and 3 Waste Feed System and Blending Operations

Each fixed hearth incinerator is designed to receive containers, aqueous liquid wastes, organic liquid wastes fed through air-atomizing nozzles, specialty liquid feeds and gases (Unit 2 only) and direct inject liquids fed through the aqueous or organic liquid feed systems. These units can receive any combination of wastes – liquid, semi-solid, solid or gases (Unit 2 only) – with a heat value of up to 16 million Btu/hr.

Each of the fixed hearth incinerators will be supported by storage/blend tanks located in Tank Farm #1. Rates of feed are controlled at each incinerator. Segregated liquid wastes are stored until utilized in the waste blending facilities. At that time, liquids are delivered to the blending tanks where the daily liquid feed to the incinerator is formulated, tested, and released to the incinerator. Blending of stored liquid wastes to achieve optimum heating value and viscosity for incineration takes place in Tanks 2, 4, 6 & 8. Six additional tanks (10, 20, 30, 40, 50 & 60) are used to segregate different waste stream types for blending of liquid feed to the incinerator. Several criteria are important in designing a blend from available wastes that have been segregated principally by physical and chemical properties. These include compatibility, proper range of heating value, and permit restrictions regarding elemental composition (based on emission limitations).

In compliance with the Benzene NESHAP, all tanks are vented to individual carbon adsorption canisters for removal of organics before vapor is discharged to the atmosphere. Each carbon adsorber canister is essentially equivalent to a 55 gallon container or greater, if necessary. All tanks are equipped with conservation vents, in addition to the carbon canister adsorber. All tanks are grounded, and flame arrestors are installed between the carbon adsorbers and the tanks.

#### 2.2.1.1 Organic and Aqueous Liquid Waste Feeds

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## Onyx Comprehensive Performance Test Plan

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These liquid waste injectors used in the combustion chambers are air-atomizing, internal-mix type injectors. These are used for injection of high Btu, low Btu liquids and specialty feed liquids. Dual fluid injection nozzles will be used for atomization of the waste. Each of injectors are rated at 0-425 gph.

### 2.2.1.2 Packaged and Bulk Solids

Fiberboard or plastic containers (fully or partially full of waste), up to 40-gallon size, may be charged directly to the primary chamber. These will be received at the dock adjoining each fixed hearth incinerator, and charged to the incinerator within 24 hours or returned to permitted storage.

Solids, usually packaged in plastic or fiberboard containers, are introduced into the incinerator through a PLC controlled airlock-ram system located at the lower front of the primary chamber of the incinerator. The airlock is composed of a refractory-lined door, a door into the airlock enclosure, and a pneumatic ram. The action of the feeder is as follows:

- 1) With incinerator door closed, the airlock door is opened.
- 2) Weighed charges of waste are conveyed into the airlock chamber.
- 3) The airlock door is closed.
- 4) A switch is activated either automatically or manually, which opens the door to the incinerator and actuates the ram that pushes the waste into the incinerator. The ram then retracts and the incinerator door closes.

### 2.2.1.3 Specialty Liquid Feeds and Gases

Specialty Feed Systems associated with Incinerators No. 2 and No. 3 are as follows:

#### Incinerator #2:

- Specialty Feeder
- Compressed Gas Cylinder Feed System
- Direct Inject Liquid Feed System

#### Incinerator #3:

- Hooded Specialty Container Feeder
- Glove Box Emission Control Systems
- Direct Inject Liquid Feed System

## **2.2.2 Unit 4 Waste Feed System and Blending Operations**

The Unit 4 Rotary Kiln can incinerate any of the waste that Onyx is authorized and permitted to receive. All physical forms of wastes will be handled and fed by the system's waste feed devices. Liquids will be fed to either the kiln or the Secondary Combustion Chamber (SCC). Bulk solid wastes will be fed to the kiln through either the ram feeder or the screw auger. Containerized wastes will be fed to the kiln through the ram feeder or the auxiliary ram feeder. Current restrictions for wastes fed to the system are summarized below:

1. High Btu liquid waste fed to the SCC must have a heating value greater than 5,000 Btu/lb.,
2. The total thermal loading to the kiln and SCC from all waste must be less than 50 Million Btu/hr., and
3. The maximum chlorine input into the unit must be less than 500 lb./hr.

### **2.2.2.1 Organic and Aqueous Feed Systems**

Tanks adjacent to Unit 4 are used to store the liquid organic waste, aqueous wastes, pumpable sludges and virgin fuel to be fed to the system. Pumps to transfer these wastes and fuel to the system are installed in the tank farm. The material is transferred through above-ground pipelines from the tank farm to the system. Pipelines used to transfer liquid organic waste and aqueous waste are equipped with strainers.

Pumpable sludges, aqueous wastes and organic liquid wastes will be fed to the kiln through the liquid waste nozzles. Organic liquid waste will be fed to the SCC through the liquid waste nozzles. Three liquid nozzles feed the kiln:

1. An aqueous waste nozzle designed for up to 13 gallons per minute (gpm) flow,
2. A sludge nozzle designed for up to 20 gpm flow, and
3. A high Btu liquid waste sized for up to 15 gpm flow.

Each of the liquid waste feed nozzles on the kiln faceplate has externally atomized injection nozzles. The high Btu liquid waste and aqueous waste nozzles are served by parallel redundant pumps and recirculation systems with back pressure control.

### **2.2.2.2 Packaged and Bulk Solids Feed Systems**

Containers of wastes are sampled and analyzed after receipt in accordance with the facility's Waste Analysis Plan. These wastes can then be delivered directly to Unit 4 or repacked into small combustible containers at the facility. Repackaged containers are delivered to, and staged in the Container Storage Unit No. 6, adjacent to the Unit 4 incinerator. When scheduled for feeding to the

system, the containers of waste are transferred by conveyor or forklifts to the feed conveyors serving Unit 4.

Bulk solids and non-pumpable wastes are delivered to, and discharged into waste feed bins in the Bulk Solids Storage Building, after being received, sampled, and analyzed. A clam shell operating from an overhead crane is used to transfer these wastes from the bins to the feed hoppers discharging to the system's ram feeder and screw feeder. The weigh hopper is equipped with weigh cells so each charge of waste can be weighed before it is discharged into the ram feeder. Fugitive emissions are controlled by a baghouse, cyclone/baghouse, and carbon adsorption system connected to this system.

The ram feeder is a 25-inch wide x 42 inch high (inside dimensions) rectangular tube operated by a hydraulically driven ram. The ram tube is equipped with a vertical, hydraulically operated charge door near the kiln end. This door is opened before the ram begins advancing to push a charge into the kiln. After the ram has fully retracted, a limit switch triggers the door to close, so as to protect the ram feeder from the kiln's radiant heat. The ram is capable of operating from 0-30 cycles/hour.

The top face of the ram feeder has a 2' x 2' opening which receives waste charges from the hopper. The ram feeder isolation gate, the charge door, and the ram operate in sequence. At the beginning of a cycle, the ram is fully retracted. On a "start" command from the operator or the programmable controller, the ram feeder isolation gate opens to receive a charge of wastes from the hopper. The gate then closes, the charge door opens, and the ram begins its advance. Once the ram reaches its full extension, it begins to retract. When the ram is fully retracted, the charge door is closed and the cycle can be repeated. This system, its sequenced operation combined with the negative pressure in the kiln prevent fugitive emissions from escaping the kiln ram feeder system.

The ram feeder also receives containers of wastes delivered by an auxiliary feed system. The auxiliary feed conveyor is capable of handling charge weights of 1 to 100 pounds. The system is capable of handling charge sizes up to 24 inches in diameter and 24 inches tall. The auxiliary feed conveyor is capable of making 60 charges an hour or one complete cycle every minute.

A screw feeder of approximately 12 inches in diameter operates in a pipe and transfers wastes from a second hopper (adjacent to the hopper serving the ram feeder) to the chute that discharges into the feed end of the kiln through the lower section of the surge vent. Bulk solid wastes fed through this system are transferred from the solid waste bins to the hopper by the overhead crane-operated clamshell, described above. The hopper is equipped with weigh cells and a slide gate, so that the solids can be weighed prior to being discharged into the screw feeder. The screw feeder feeds material up to an approximate 36,000 pounds per hour, maximum rate. Material is screened to afford a lump size of approximately two inches maximum.

## **2.3 Manufacturer, Make and Model of the Incinerator [40 CFR §63.1207(f)(1)(iii)(A)]**

### **2.3.1 Combustion Chamber and Burners [40 CFR §63.1207(f)(1)(iii)(B) and (C)]**

#### **2.3.1.1 Units 2 and 3**

Incinerator units 2 and 3 feature a two-stage combustion process. Ignition of waste material takes place in the primary (lower) combustion chamber. A secondary (upper) combustion chamber serves as an "after-burner" for process gases. Ignition of the waste takes place at temperatures in excess of 1,500 degrees F. The secondary combustion chamber maintains a minimum temperature of 1,750 degrees F. These temperatures are presented in current operating conditions.

Each Series 2 incinerator has a total of two burners, one burner, a North American burner, rated at 12.0 million Btu/hr., is used in the lower chamber to maintain temperatures. It will burn only natural gas or No. 2 fuel oil. A second burner is mounted in the upper chamber; it too will be used to supply additional heat and will be fueled with natural gas or #2 fuel oil. This burner is a North American Burner, rated at 6.0 million Btu/hr. Liquid or gaseous wastes are injected through separate feed nozzles as described in section 2.2.1.1, above.

The primary and secondary chambers have an external diameter of 9 feet, and are 17.5 feet long. The interior walls of both chambers are lined with approximately 10 inches of brick refractory and insulation backing, making the internal operating diameter approximately 7'2". The cross-sectional area of the chambers is thus 40.3 square feet. Combustion air is controlled separately in the upper and lower chambers. Table 2-1 provides a summary of the incinerator design specifications.

Following ignition of the waste material under controlled or starved-air conditions in the lower chamber, off-gases travel through a refractory-lined flue gas passage into the upper chamber, which acts as an afterburner. Turbulence is achieved by the tangential introduction of air and additional fuel in the upper chamber. Gas temperatures are normally maintained at 1,800-2,200 degrees F in the upper chamber and 1500-1900 degrees F in the lower chamber, pursuant to current Illinois EPA permit operating conditions.

Leaving the upper chamber, the hot gas stream travels through 28 feet of refractory-lined stack sections before reaching the start of the gas scrubbing system. The combined volume of the upper and lower chambers, the flue gas passage and the hot crossover section is approximately 1,567 cubic feet. The total retention time of combustion gases within the system is approximately 5 seconds. The incinerator is rated at 16 million Btu/hr., with a design unit heat release of approximately 10,000 Btu per cubic foot. Maximum gas volume when firing a heat release of 16 million Btu/hr. is about 15,000 acfm at 400 degrees F.

Onyx Comprehensive Performance Test Plan

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**2.3.1.2 Unit 4**

The Unit 4 incinerator also features a two stage combustion process which is described below.

**2.3.1.2.1 Rotary Kiln**

The rotary kiln is fabricated of carbon steel. It has approximate dimensions of 8'8" O.D. X 35' long. It is supported on a one-degree slope by two steel tires or riding rings. Each riding ring rides on two pairs of steel trunnions and have an approximate outside diameter of 9 feet 5 inches. The thickness and face width of the trunnions are approximately 6 inches and 9 inches, respectively.

The kiln is lined with approximately 7 ½ inches of dense abrasion-resistant high-alumina firebrick refractory. The refractory system was installed with built-in refractory lifters to agitate and aid in moving solids through the kiln. With this refractory system, the kiln has an inside diameter of approximately 7 feet and a length of approximately 35 feet, an integral cross-section area of approximately 38 square feet and an internal volume of approximately 1,346 cubic feet.

All kiln feeds will enter through the upper kiln face plate which is located on the feed end of the kiln. The plate contains a primary burner, three liquid feed nozzles, (for pumpable sludge, aqueous waste, and high Btu liquid waste) an air turbulence nozzle, a ram feeder and a surge vent.

The primary burner is equivalent to a North American 'Fuel Directed' burner of 25 MMBtu/hr. and burns No. 2 fuel oil or natural gas. The burner system is supplied with atomizing air at approximately 50 psig pressure and approximately 4,000 acfm combustion air at a static pressure of 20" water column (WC). The pilot for the primary burner will burn No. 2 fuel oil or natural gas.

A turbulence air nozzle also enters the front of the kiln through the faceplate. It can inject up to 4,000 acfm of air to provide additional turbulence to enhance air/solids contact, and provide excess oxygen for combustion of the waste streams. It receives pressurized air from the combustion air-forced draft fan that supplies combustion air for the primary burner.

The fuel system for the kiln (and secondary combustion chamber) is controlled by a Factory Mutual approved burner management system complete with interlocks and safety valves.

**2.3.1.2.2 Secondary Combustion Chamber (SCC)**

The SCC is a vertical, cylindrical chamber having approximate dimensions of 10'-6" O.D. x 71' high. It is fabricated of carbon steel and lined with an inner course (hot face) of approximately six inches of high alumina refractory and an outer course of approximately two inches of insulating refractory. With this installed refractory, the SCC has an inside diameter of approximately nine feet. The effective length (gas retention length) of the chamber is approximately 48' - 6". Consequently, the SCC has a cross-section area of 64 square feet and an effective volume of approximately 3,084 cubic feet. At maximum combustion gas flows, the combustion gas residence time is greater than two seconds.

Onyx Comprehensive Performance Test Plan

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Combustion gases from the kiln enter the bottom of the SCC through a refractory-lined side duct and exit from the top of the SCC through a refractory-lined duct to the tempering chamber. The floor of the chamber is sloped to facilitate the removal of ash and solids through a slag tap.

The SCC is equipped with one burner mounted on the sidewall of the chamber near the bottom. The burner is a Trane Thermal Model or equivalent, with a design heat release of approximately 30 million (MM) Btu/hr. This burner is supplied with No. 2 fuel oil or natural gas and combustion air.

As with the kiln burner, the SCC burner is supplied with atomizing air and is equipped with a burner management system. This system controls the ignition and initiates an automatic shutoff when there is a loss of flame, combustion air supply, fuel pressure, atomizing air pressure, pilot burner or ID fan.

The SCC burner is a high-intensity, vortex type unit with a spin vane assembly, located within the windbox to impart an intense rotary motion to the combustion air. This rotary motion and the burner design provide complete mixing of air and fuel, and recirculation of the gases within the combustion chamber promotes rapid combustion and high heat intensity.

**2.3.2 Location of Combustion Zone Temperature Device [40 CFR §63.1207(f)(1)(xix)]**

**2.3.2.1 Units 2 and 3**

The thermocouple that monitors temperature in the primary combustion chamber is located on top of the chamber about five feet from the transition. The thermocouple that monitors temperature in the SCC is located on top of the chamber above the transition.

**2.3.2.2 Unit 4**

The pyrometer that monitors temperature in the rotary kiln is located top-center in the transition section between the rotary kiln and the SCC about two feet downstream from the exit of the kiln. The thermocouple that monitors temperature in the SCC is located on west side of the chamber near the SCC exit duct.

**2.3.3 Hazardous Waste Residence Time [40 CFR §63.1207(f)(1)(ix)]**

**2.3.3.1 Units 2 and 3**

The Hazardous waste gas residence time for the Fixed Hearth Incinerators is calculated as follows:

Primary Combustion Chamber Volume – 635 ft<sup>3</sup>

Secondary Combustion Chamber Volume – 635 ft<sup>3</sup>

Total Volume – 1270 ft<sup>3</sup>

Maximum Flue Gas Flowrate – 17,382 acfm (290 ft<sup>3</sup>/sec)

$$\text{Total Combustion Zone Residence Time} = (1270 \text{ ft}^3) / (290 \text{ ft}^3/\text{sec}) = 4.4 \text{ sec}$$

#### 2.3.3.2 Unit 4

The hazardous waste gas residence time for the Unit 4 Rotary Kiln Incinerator is calculated as follows:

Rotary Kiln Volume – 1346 ft<sup>3</sup>

Secondary Combustion Chamber Volume – 3084 ft<sup>3</sup>

Total Volume – 4430 ft<sup>3</sup>

Maximum Flue Gas Flowrate – 43,000 acfm (717 ft<sup>3</sup>/sec)

$$\text{Total Combustion Zone Residence Time} = (4430 \text{ ft}^3) / (717 \text{ ft}^3/\text{sec}) = 6.2 \text{ sec}$$

#### 2.3.4 Combustion System Leaks

##### 2.3.4.1 Units 2 and 3

Combustion system leaks in Units 2 and 3 are prevented through maintaining a totally sealed combustion chamber, coupled with the use of an induced draft fan that maintains a vacuum of normally – 4 to – 6 inches of water column in both combustion chambers while wastes are being fed to the unit.

##### 2.3.4.2 Unit 4

The kiln itself is equipped with a double seal system that is comprised of overlapping, adjustable, stainless steel spring plates on both the feed and discharge ends of the kiln. The sealing edges of each plate are fitted with a sintered-metal wear shoe similar to a brake shoe with the inner seal resting on the kiln shell. The powdered metal formulation for the seal shoes include graphite granules, which make the shoes self-lubricating. The void between the seals and the outer shell of the kiln is pressurized to further prevent fugitive emissions. In addition to the kiln seal system, Unit 4 also utilizes an induced draft fan that maintains a vacuum of – 0.5 to – 1.0 inches water column while waste is being fired into the system.

##### 2.3.5 Emergency Safety Vent

Units 2 and 3 are equipped with thermal relief vents. Unit 4 is equipped with two emergency vents, one located at the kiln inlet which acts as an emergency pressure relief, the second is located at the top of the SCC as a thermal relief vent.

Onyx Comprehensive Performance Test Plan

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The emergency vent at the kiln inlet would only be required for an occurrence that overwhelms the ability of the ID fan to control the pressure of the kiln. The vent and chute opening is designed such that waste from the bulk solids chute would not impede the escaping gas flow. A deflector separates the feed flow from the vent opening. The entrainment of solids through the surge vent is minimal. As an extra precaution, the exhaust opening of the vent is angled to provide a horizontal exit, thereby, minimizing solids entrainment into the air. The vent is kept closed by weighted louvers. These louvers will open only if the pressure in the kiln suddenly rises beyond the compensating capacity of the ID fan. A limit switch on the louvers will automatically shutoff all waste feeds to the kiln and SCC when the vent is opened.

A second, refractory-lined emergency thermal relief vent is installed at the top of the SCC for releasing hot combustion gases in the event that any one of the emergency shutdown procedures occurs. This vent is equipped with a cap held closed by a pneumatic cylinder and can be opened manually by the operator when there is any one of the following conditions:

- A power failure,
- A failure of the ID fan,
- Combustion gas temperatures exiting the spray dryer absorbers, which exceed the alarm set-point, or
- A loss of air pressure.

A limit switch on the cap shuts off all waste feeds to the system as it senses that the cap is opening. As an added precaution, all conditions, as stated above, initiate a shutoff of all waste feeds.

#### **2.4 Procedures for Rapidly Stopping Hazardous Waste Feed During Equipment Malfunction [40 CFR §63.1207(f)(1)(viii)]**

Equipment malfunctions are identified by the control system, observation of process control variables, or by regular field inspections.

In the event of a minor equipment malfunction (e.g. waste feed or scrubber leaks), the control room operator will be notified by radio. The control room operator will then disable the waste feed pumps and close the waste feed valves.

In the event of major equipment malfunction (e.g. fire), the emergency stop button located in the control room will be pushed. If this button is pushed all equipment will switch to its fail-safe position.

## **2.5 Air Pollution Control Equipment [40 CFR §63.1207(f)(1)(iii)(G)]**

### **2.5.1 Air Pollution Control Systems Descriptions for Units 2 and 3**

The air pollution control system consists of a spray dryer absorber and fabric filter baghouse. The air pollution control system neutralizes acidic compounds and removes particulate from the exhaust gas. Two subsystems, the spray dryer absorber and the fabric filter, carry out the chemical neutralization and particulate removal functions, respectively. A third subsystem, the lime system, is used to prepare and provide lime slurry to the spray dryer absorber for use in the chemical neutralization process. The induced draft fan and stack provide the mechanical energy required to transport the flue gas through the interconnecting ductwork, to its eventual discharge point to atmosphere.

#### **2.5.1.1 Lime System**

The lime system prepares lime slurry for use in the chemical neutralization process in sufficient supply and concentration to maintain continuous flue gas treatment in the spray dryer absorber. The system has been designed for batch mixing to provide this service.

Hydrated lime is stored in a storage bin above the lime preparation area. The storage bin is sized to hold enough hydrated lime to maintain several days of system operation at the maximum combustion rate of the incinerator. Lime is discharged through the conical storage bin bottom. The flow of the material from the bin is aided by a vibrating "live bottom," or bin activator. A variable speed rotary feeder is used to meter the hydrated lime in the proportions required for batch mixing lime slurry. The lime is mixed with water in a tank beneath the lime storage bin. The rotary feeder speed and the rate that water is added to the lime slurry tank are variable so that the desired 20% lime solids concentration can be achieved in the tank. The variable feed adjustments allow water and lime to be added to the lime slurry tank at a rate that will allow a batch mode of mixing. An agitator is provided in the slurry tank to mix the water and lime and to maintain the suspension of lime solids. The mixed lime slurry is pumped at a continuous rate of flow through a recirculation loop to the atomizer.

#### **2.5.1.2 Spray Dry Absorber**

Slurry flow to the spray dryer absorber is metered by a flow control valve to obtain the proper feed concentration to the spray dryer absorber atomizer. Automatic (or manual) adjustment to the flow is made as a function of the output from a hydrochloric acid (HCl) analyzer in the gas duct downstream of the Fabric filter. The amount of slurry metered is proportional to the amount of HCl monitored.

The slurry passes through a stationary swirl-type liquid distributor into the atomizer wheel where induced centrifugal force from the rapidly spinning wheel discharges the slurry through the wheel nozzles at high velocity. The design of the atomizer wheel, its rate of spin, and the discharge velocity of the slurry, create a cloud of finely divided droplets around the periphery of the atomizer wheel. A

instrument sampling ports and a sampling platform for emissions testing. Figure 5-1 provides details on the design and sample port locations and configurations for all Units 2 and 3.

## **2.5.2 Air Pollution Control System for Unit 4**

### **2.5.2.1 Tempering Chamber**

The tempering chamber is a vertical, cylindrical unit designed to cool the combustion gases using a series of internal dual-fluid (water and air) spray nozzles. The combustion gases enter the top of the chamber, flow downward through the spray pattern and exit from the bottom of the chamber. The spray pattern is designed to eliminate direct contact of water with refractory, and the chamber is designed to maintain a dry bottom under all operating conditions. That is, the injection rate of spray water is controlled, so that it is completely vaporized and carried out of the chamber in the combustion gases. The tempering chamber is approximately 49' high with 11' I.D. and is fabricated of ¼ inch nominal plate thickness carbon steel (ASTM A36) and lined with refractory. The spray nozzles and extensions are fabricated of 304 SS material.

The tempering chamber is sized so that a combustion gas retention time of greater than one second will be maintained at all gas flows. Because some molten particulate materials in the combustion gases are cooled in this process unit to below their fusion point, some solids are generated and collected in the chamber. Therefore, the chamber has a cone bottom and double valves to facilitate the removal of solids. These solids are discharged onto a conveyor system, which transports them to a hopper.

### **2.5.2.2 Spray Dryer Absorber**

Unit 4 is equipped with two Spray Dryer Absorbers (SDA) located immediately downstream of the Tempering Chamber. Each SDA unit is fabricated of 3/8 inch carbon steel. The SDAs operate in parallel to:

- Further cool the combustion gases from 600-800°F to 300-500°F,
- Neutralize and remove HCl and other acids from the combustion gases,
- Remove a portion of the particulate (flyash) from these gases.

The combined units are sized to remove more than 820 lbs./hr. of chlorine from the combustion gases. Each SDA is approximately 72' high by 10'7" in diameter. Each unit includes a head section, and a 60° conical hopper. Each SDA chamber has one access door in the upper section. Each hopper has one access door, a flanged clean-out port, and a drain connection. The SDA head section consists of a flanged inlet connection and a hot gas inlet plenum. The dual-fluid atomizing nozzles include stainless steel housings and stellited inserts. The nozzles are assembled to permit field removal from the piping. The two lime slurry piping headers have automatic isolation valves.

Combustion gases enter the top of each of these units, flow downward through a central duct and are dispersed symmetrically from this duct into the absorber chamber at a velocity and direction that assures optimal contact with the cloud of atomized lime slurry droplets introduced into the chamber by dual-fluid (lime slurry and air) nozzles. The gases then flow downward through each absorber chamber and exit through a bottom side duct. As the gases contact and pass through the cloud of atomized lime slurry, the water in the slurry evaporates, cooling the gases. Simultaneously, the lime in the slurry reacts with the hydrogen chloride in the gases to produce calcium salts. Some of the resulting dry material, consisting of calcium salts, flyash and excess lime, falls to the conical bottom of each unit. The dry material from each unit is discharged to a conveyor system, which transports it to a dump trailer, or equivalent type system.

#### 2.5.2.3 Fabric Filter

The fabric filter consists of two modules connected in parallel. Each module is divided into three compartments connected in parallel, which contain multiple fabric filter bags through which the combustion gases pass to remove particulates. The modules provide an operating air-to-cloth ratio of approximately 4:1. The bags are periodically cleaned via a pulse air jet, which causes the particulate matter to fall to the bottom hoppers of each module. From there it is discharged to a conveyor system which transports it to a dump trailer, or equivalent type system.

Each fabric filter consists of a trailer mounted unit subdivided into three compartments. Each compartment has a clean air plenum and housing section to contain approximately 308 bags. Each bag is approximately 5" in diameter by 5' long. The baghouses are fabricated from 3/16" mild steel plate, of welded construction, gas tight and stiffened to withstand the maximum operating negative pressure. Each compartment has a tube sheet that supports the bags and provides for top bag/cage removal. Access to the clean air plenum is via a bolted access door. Each trailer mounted unit contains the compressed air headers, gas inlet and outlet manifolds, and the conveyor.

The fabric filter is equipped with a high efficiency pulse-jet cleaning system. The cleaning system uses low pressure, approximately 40-80 psig, and compressed dry air to dislodge the accumulated particulates from the bags. A solid state programmable controller accomplishes the control of the air flow. The filter units are designed to minimize filter bag wear by cleaning on demand, yet maintaining the desired pressure drop across the fabric filter. Alternately, at the option of the operator, the units can be cleaned on a timed cycle, in a manual mode or on the basis of high pressure drop. The pressure drop set point is adjustable, but normally is less than 8" of w.c. The bags are designed for 25" w.c. vacuum, which is greater than the maximum negative pressure the ID fan can develop. The design allows the bags to be cleaned when the fabric filter is in operation. For a six compartment unit, one sixth of the total bags, or one third of a module can be isolated. The remaining five-sixths of the fabric filter capacity is more than adequate to accommodate the process requirements. The filter medium is a 22 oz./sq. yd., woven fiberglass material, with an acid resistant finish. Bags include snap

rings for easy and dust tight installation. The bags are held in place by bag cages constructed of galvanized steel wire.

#### 2.5.2.4 Carbon Injection and Lime Recirculation System

The carbon injection system will air inject activated carbon into the plenum immediately upstream of the baghouses and allow for a more efficient means of controlling Dioxin/Furan and mercury emissions. To compliment this system and to incorporate waste minimization, the Facility is permitted to pull a slip stream of the partially reacted lime from the exit of the baghouse solids discharge system and recirculate/recycle this back to the Spray Dryer Absorbers (SDA's) to further aid in HCl removal and Dioxin and Furan removal.

The carbon injection system will be controlled by an existing PLC, which will control the input of activated carbon to the baghouse inlet plenum to allow from 2 to 20 pounds per hour of powdered activated carbon to be air injected into this plenum and allow for direct contact with the stack gases exiting the SDA's.

The amount of carbon is dosed in a dust-free manner into a low pressure air stream via pneumatic education. The eductor uses a blower for the motive air. The carbon/air stream will then travel through piping to the injection nozzle into the ductwork. The carbon will contact the gas stream exiting the SDA's and allow for the adsorption of any dioxin/furans and mercury that might be present in this stream. Adsorption will continue as the stack gases proceed through the baghouses. The clean stack gas will exit the final stack via the induced draft fan and the captured solids will be discharged from the baghouses via the screw conveying system into a enclosed dump trailer for disposal at a Subtitle C landfill.

In addition to this system, the facility is permitted for a lime recirculation system that will direct a portion of the spent lime and carbon stream back into the Spray Dryer Absorbers. This recirculation system will serve two purposes. The main objective will be to further aid in the neutralization of HCl and the adsorption of Dioxin/Furan and Mercury in the SDA's. The second objective is the minimization of hazardous waste that will be generated and requiring disposal at a Subtitle C landfill by recycling a portion of the partially reacted lime.

The spent lime and carbon stream that will exit the baghouses will contain up to 50% unreacted lime and a portion of unadsorbed activated carbon. A slip stream of this residual will be taken out of each baghouse system and directed back to each SDA. Since the SDA's and baghouses are in parallel, the North baghouse residual stream will be directed to the North SDA and the South baghouse residual stream will be directed to the South SDA. A portion of this residual stream (determined by emissions testing) will be taken directly from the exit of each baghouse via a pneumatic airveying system

## Onyx Comprehensive Performance Test Plan

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powered by a eductor blower system and fed back into the SDA's. The residual will be blown into the SDA's via an injection nozzle that will be located approximately 20 feet down from the gas inlet duct of each vessel. This stream will add more neutralizing and adsorbing surface area and further aid in the removal efficiency of this vessel. The unreacted lime portion of this stream will aid in neutralization of HCl and the increased surface area of the total residual stream will aid in the adsorption of any Dioxin and Furan compounds which are present in the off gases. The basis is providing more surface area in the gas cleaning train for the Dioxin and Furan compounds to adhere thus reducing the stack emissions of these compounds

This closed-looped system will provide a constant cycle of adding and removing spent lime via the recirculation system, so theoretically the composition of the recirculation feed stock should remain fairly constant.

### 2.5.2.5 Induced Draft Fan and Stack

The ID fan draws combustion gases through the system and discharges them through the stack. It has a carbon steel centrifugal design sized to develop a pressure of approximately 25" wc at a maximum gas flow of approximately 53,000 acfm at 400°F. The ID fan was sized to maintain a negative pressure of ½" w.c. in the kiln and greater negative pressures throughout the remainder of the system, thereby, preventing fugitive emissions.

The ID fan includes an inlet volume control damper to be used to control the pressure of the kiln. The stack diameter for Unit 4 is 48 inches I.D. and is 100 feet high. Unit 4's stack is equipped with instrument sampling ports and a sampling platform for emissions testing. Figure 5-2 provides details on the design and sample port locations and configurations for the stack.

### 2.6 Stack Emissions Monitoring [40 CFR §63.1207(f)(1)(iii)(H)]

The continuous emissions monitoring (CEM) system consists of sample probes, sample delivery and conditioning apparatus, and gas analyzers. Samples are extracted from the transition ducting located between the scrubber and stack. A CEM performance test and quality assurance program has been implemented in accordance with **Performance Specifications for Continuous Emission Monitoring of Carbon Monoxide and Oxygen for Incinerators, Boilers and Industrial Furnaces Burning Hazardous Waste**, as defined in 40 CFR 266, Appendix IX, Section 2.1.

Responses from each CEMS will be fed to the Control System (CS) where the CO hourly rolling average is calculated and interlocked to the waste feed cutoff valves as part of the Automatic Waste Feed Cutoff System (AWFCO) discussed in Section 2.8, below. The following provides a brief description of the CEMS instruments including the operating range and measurement principal.

### 2.6.1 CEM System Description for Units 2 and 3

The Continuous Emissions Monitoring System (CEMS) currently being utilized at Incinerators 2 / 3 includes measurement of the combustion gas oxygen, carbon monoxide, hydrocarbon, and hydrogen chloride concentrations; opacity; and gas velocity. The table below summarizes the analyzer specifications. Each analyzer is briefly discussed in the following paragraphs. The facility is currently in the process of installing a new ECOCHEM M3 CEM system. Details will be provided once this system is installed and in operation.

An ETC 3100 analyzer is used for monitoring oxygen concentration. The monitor is an in situ zirconium oxide (fuel cell) analyzer. The analyzer probe/cell assembly is situated in the common duct connecting the baghouse modules and the ID fan.

The Altech System is used for monitoring carbon monoxide, total hydrocarbons, and hydrogen chloride. The monitor is an extractive non-dispersive infrared (NDIR) analyzer. Opacity will be continuously monitored using a Dynatron 1100 M white light monitor. Stack gas velocity is continuously monitored using a PSE Series 100 annubar flowmeter. The velocity sensor is located in the stack.

Parameter	Current Mfg	Range	Principle
Oxygen	COSA	0-25%	Electrochemical
Carbon Monoxide	Altech MCS 100	0-700 ppmv	Infrared
Total hydrocarbons	Compur FID	0-100 ppmv	FID/Infrared
Hydrogen chloride	Altech MCS 100	0-700 ppmv	Infrared
Opacity	Dynatron 110M	0-100%	White light
Stack gas flow	PSE Series 100	0-20,000 acfm	Pressure drop

### 2.6.2 CEM System Description for Unit 4

The Continuous Emissions Monitoring System (CEMS) currently being utilized at Incinerator 4 analyzes for opacity, carbon monoxide, hydrogen, chloride, total hydrocarbons and oxygen. These monitors except opacity are extractive devices mounted in the ductwork between the ID fan and the stack. The table below summarizes the analyzer specifications. The facility is currently in the process of installing a new ECOCHEM M3 CEM system. Details will be provided once this system is installed and in operation.

## Onyx Comprehensive Performance Test Plan

The opacity monitor continuously measures the stack gas opacity, and reports the measurements to an indicator and a recorder. An opacity that exceeds a preset limit triggers an alarm and interlock.

Carbon monoxide and hydrogen chloride are monitored with extractive non-disperse infrared analyzers. Total hydrocarbon is monitored with an extractive flame ion detector analyzer. Oxygen is monitored with a zirconium oxide cell. Opacity is monitored with an analyzer operating in the visible light spectrum.

Stack gas flow rates are continuously monitored using two redundant anubars, that send 4-20 mA signals to the control room, where the operator selects one of the two to be used to report the selected flow measurement to an indicator and recorder. The computer monitors the signals from both transmitters and triggers an alarm, if there is sustained significant difference between the two readings. A flow rate that exceeds a preset limit triggers an alarm and an interlock.

Parameter	Current Mfgs	Range	Principle
Oxygen	COSA ZFK-1	0-10%	Electrochemical
Carbon Monoxide	Altech MCS 100	0-700 ppmv	Infrared
Total hydrocarbons	Compur FID	0-100 ppmv	FID/Infrared
Hydrogen chloride	Altech MCS 100	0-700 ppmv	Infrared
Opacity	Dynatron 110M	0-100%	White light
Stack gas flow	PSE Series 100	0-55,000 acfm	Pressure drop

### 2.7 Process Monitoring and Control

There are three separate control systems that operate each of the three incinerator systems. Each control system is capable of monitoring the "operational envelope" of the incinerator and is capable of performing a number of activities including:

- Control room indication of processor sensors located within the incinerator system (such as pressure indication of a field installed pressure transmitter);
- Process controller for single instrument loops or an individual sub-system, such as a pressure control loop involving a sensor reading from one pressure transmitter affecting the function of one pressure control valve; and
- Alarm for an exceedance of a designated setpoint, such as a high pressure or low temperature.

Each process control computer will continuously control and monitor the operation of that incinerator. When out-of-range conditions exist, it will notify the operator of those conditions. The process control

computer is programmed to shut-down equipment (i.e., bring the system into a safe mode) when designated parameters are exceeded, which is a protective mechanism against potential equipment damage, operation outside of permit limits, or conditions that might lead to a release to the environment.

#### 2.7.1 Units 2 and 3

Continuous monitoring of the incinerator and scrubber system is an important aspect of the TWI-2000 unit design. A digital readout of all monitoring instrumentation is displayed on the main control screen. An audible and visual alarm alerts the incinerator operator to significant deviations from normal operating conditions. This system allows an immediate response to adverse conditions by the operator. Automatic waste feed cut-off and incineration shutdown mechanisms are also interlocked with the monitoring system at permit limit levels. Monitoring methods and frequencies are listed in Table 2-2.

Incinerators No. 2 and No. 3 each have two (2) independent process control computers that interface to the Quantum Programmable controllers. Either of the two process computers is capable of controlling the incinerator in case of a failure in a computer. These computers run an RSVIEW HMI control software that provides operator interface to all instrumentation and controls.

#### 2.7.2 Unit 4

The facility is equipped with a state-of-the-art monitoring and control system, which facilitates compliance with permit conditions, and otherwise, collects process control information, facilitates efficient operation and detects and prevents damage to the facility. The system consists of three major components:

- A human-machine interface (HMI) system,
- Programmable logic controller's (PLC's), and
- A high speed ethernet cable connects all control system components

The desired control functions are implemented through the HMI system. All digital control and emergency interlocks are accomplished by the PLC. The two microcomputers are furnished with printers and provide graphic and numerical information concerning the status of the process train.

Those instruments that are germane to achieving compliance with permit conditions are described and discussed in the text of this section.

## 2.8 Automatic Waste Feed Cut-off System [40 CFR §63.1207(f)(1)(iii)(F)]

Each incinerator has an Automatic Waste Feed Cut-Off (AWFCO) System that will shut waste feeds off in the event certain operating parameters deviate from allowable set points. The PLC continuously monitors operating parameters, making adjustments to the process as needed for proper control. Alarm logic is incorporated into the PLC system to automatically initiate an AWFCO. Tables 2-2 and 2-3 summarize current AWFCO set points for Units 2 & 3 and 4, respectively. AWFCO limits have been established based on several factors that are summarized below.

- Regulatory/permit limits – established to comply with existing permits. An example of this type of limit is the low temperature limit, below which waste can not be fed until the proper limit is re-established.. In addition, the HWC MACT regulations require that the AWFCO system be interlocked with the span of each process instrument that is part of the Continuous Monitoring System (CMS). A listing of these CMS instruments and their interlocked span setpoints is maintained as part of Onyx's Operating Record. AWFCO system setpoints are set within permitted ranges to facilitate testing.
- Process safety limits – established to assure process equipment is protected and unsafe operating conditions do not occur. An example of this is inadequate excess air in the combustion chamber that can lead to fuel rich conditions.
- Utility or Power failure – established to facilitate a controlled shutdown of the process during loss of process air, steam, water or electricity. An example of this is the loss of instrument air that is necessary for certain types process instruments to function properly. Wastes will not be re-introduced into the incinerators until proper operation of key instruments is re-established.

In addition to the AWFCO system, operators can manually shutdown waste feeds or the entire process should this be needed.

### 2.8.1 AWFCO System Testing

Onyx tests the AWFCO systems bi-weekly. Instrument calibrations are performed as indicated in Tables 2-2 and 2-3. In some cases this testing occurs more frequently depending on how often actual AWFCOs occur at the unit. Per the required frequency, incinerator personnel check the functionality of AWFCO logic that is part of the incinerator's PLC system to make sure that should process conditions deviate from allowable limits, the computer logic will initiate waste feed shutdowns as required. This is accomplished by manually simulating process conditions that are outside allowable limits and observing and documenting when the control or block valve software logic on the waste feed line begins to initiate valve closure. Should actual AWFCOs occur during a given testing period, these are documented by operating personnel to satisfy regulatory requirements for system testing. Results of

this testing are documented on a separate AWFCO Testing Log and maintained as part of the unit's Operating Record.

## **2.9 Air Pollution Control Equipment Maintenance Practices [40 CFR §63.1207(f)(1)(iii)(G)]**

### **2.9.1 Program Overview**

Once equipment is installed and operational, Onyx utilizes an extensive preventative maintenance (PM) program to keep equipment operational and prevent breakdowns and failures. Based upon the type of equipment and historical operations and maintenance experience, schedules for various inspection and PM activities are followed. This includes aspects such as documenting detailed maintenance histories on equipment, routine inspection and lubrication programs for high wear equipment and non-destructive testing of piping and vessels using techniques like ultrasound to assess integrity. The frequency of these activities varies depending upon the equipment, PM activity and the incinerator's shutdown schedule.

For example, frequent (i.e., weekly) instrument and certain mechanical equipment checks are made for critical process items. Lubrication, vibration analysis and other mechanical integrity checks are done at longer frequencies like monthly or quarterly. And finally, such items as inspecting refractory brick for wear, are typically performed when the entire incinerator is shut down for maintenance.

### **2.9.2 Test Program Preparation Activities**

Prior to testing, instrumentation associated with key parameters of the test will be checked, calibrated, or replaced, as appropriate, to ensure proper operation of the instrumentation during testing (i.e., waste feed flowmeters and scales, CEM's, pressure transmitters, thermocouples and pyrometers, stack flowmeters, carbon feed scales, etc.).

## **2.10 Alternative Monitoring Procedures**

This section includes the required information to support the use of alternative monitoring procedures as provided for under 40 CFR §63.1209 (f)(1)(xviii) and (g). Onyx is requesting approval for the use of alternative monitoring procedures for three operating parameters:

- Maximum Combustion Chamber Pressure for the Fixed Hearth and Rotary Kiln Incinerators;
- Activated Carbon Carrier Fluid Flow Rate for the Rotary Kiln; and
- Hydrochloric Acid/Chlorine Operating Limits for the Fixed Hearth and Rotary Kiln Incinerators.

Each of these alternative procedures are discussed in detail below.

#### **2.10.1 Maximum Combustion Chamber Pressure**

Onyx is proposing to monitor the Maximum combustion chamber pressure using an alternative procedure from what is specified under 40 CFR §63.1209(p). The approach being proposed was presented by Onyx, and verbally approved by the IEPA in a January 22, 2003 meeting. The method Onyx proposes is to continue to utilize current procedures for control of combustion zone pressures and visible emissions and AWFCO related agency reporting. First, Onyx would review video tapes of the external portions of the incinerator around the combustion zones for evidence of visible emissions when an automatic waste feed cut-off (AWFCO) occurs due to combustion zone pressure greater than allowable setpoints. Currently combustion zone pressure must be maintained at less than atmospheric on the rotary kiln and less than or equal to -0.1 in. w.c. (exceedances can occur for 5 seconds before an AWFCO is initiated) on the Fixed Hearth Incinerators. From an agency reporting perspective, the Interim MACT Standards require reporting of all AWFCO's associated with combustion zone pressure as exceedances of the Rule. Onyx proposes that AWFCO's associated with combustion zone pressures require only notification to the IEPA. AWFCO's associated with combustion zone pressures with visible emissions identified via video tape review would be reportable as defined in the Standards. Onyx has been complying with this method of control and reporting of visible emissions for many years. Historical data (notification to the IEPA of all combustion zone pressure AWFCO's and reporting of all visible emissions) of compliance with this method has documented that all combustion zone pressure AWFCO's are not evidence of visible emissions. By adhering to current reporting and notification procedures, better assurance of compliance is achieved with relevant emission standards.

#### **2.10.2 Activated Carbon Carrier Fluid Feedrate**

Onyx is proposing to monitor the activated carbon carrier fluid feed rate utilizing an alternative monitoring procedure from what is specified under 40 CFR §63.1209(k)(6)(ii). The carbon injection system used at that is operating at the Rotary Kiln was acquired as a package system which includes instrumentation and equipment that is required for the system to function correctly. Compressed air is utilized as the carrier fluid to convey the powdered activated carbon (PAC) to its injection point in the air pollution control train of the rotary kiln incineration system. To ensure that the PAC is being transported from the system to its destination, there is a high-pressure switch and there is a low-pressure switch in the transport line monitoring the carrier fluid. The high-pressure switch ensures that the transport line has not become plugged or restricted to a point that transport of the PAC is impeded. The low-pressure switch ensures that the blower has not lost its capacity to provide adequate air to transport the PAC to its injection point. These pressure switches were supplied by the manufacturer as an integral part of the carbon injection system to ensure proper operation and are currently programmed into the control system to initiate an AWFCO if either one is tripped. The Standards state that an hourly rolling average be established for flowrate or pressure drop of the carrier fluid. Onyx proposes that operation within the settings of the pressure switches, as the system was designed, provides equivalent assurance of compliance with the Standards.

Onyx Comprehensive Performance Test Plan

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### 2.10.3 Hydrochloric Acid

Onyx is proposing to monitor the Operating Parameter Limits related to complying with the Hydrochloric Acid/Chlorine emission standard utilizing an alternative monitoring procedure from what is specified under 40 CFR §63.1209(o). The method Onyx is proposing to use was presented and verbally approved by the IEPA in the January 22, 2003 meeting referred to in Section 2.10.1, above. Onyx has been operating with HCl continuous emission monitors (CEM's) since the late 1980's. The extractive units have proven reliable for the detection and control of HCl emissions. In lieu of complying with the operating parameter limits (OPL's) of minimum sorbent feedrate, minimum carrier fluid flowrate or nozzle pressure drop, and sorbent specifications, Onyx would utilize HCl CEM's. (Although there are OPL's for chlorine/chloride feedrate and flue gas flowrate that would also not be required for this standard, these are required OPL's for other emission standards.) The use of CEM's to demonstrate compliance with an emission standard is consistent with USEPA guidance for monitoring hierarchy. Onyx has collected data for Cl<sub>2</sub> emissions relative to HCl emissions during testing conducted over the past two years for the rotary kiln and fixed hearth incinerators. When collated and analyzed, the ratio of HCl to Cl<sub>2</sub> for the rotary kiln is 15:1 and for the fixed hearths is 16.3:1. These ratios indicate consistency between the rotary kiln and fixed hearth incinerators. Therefore, Onyx would utilize the most conservative ratio (15:1) to correct measured HCl emissions (via the CEMs) to total emissions of HCl and Cl<sub>2</sub>. That is, for every 15 ppm HCl measured at the stack, the documented value for HCl/Cl<sub>2</sub> would be 16 ppm. Onyx would comply with the maximum HCl/Cl<sub>2</sub> emission standard of 77 ppm for a one hour rolling average utilizing 15 second data to ultimately calculate the one hour rolling average. Utilizing an HCl CEM assures better compliance with the HCl/Cl<sub>2</sub> emission standard.

Onyx Comprehensive Performance Test Plan

Table 2-1 Technical Information Summary on Incinerator Units 2 and 3 Combustion Systems

Model No.:	TWI-2000, Series 2	
Manufacturer:	Trade Waste Incineration	
Type of Incinerator:	Fixed Hearth, Dual Chamber	
Feed Types:	Solids, Organic Liquids, Aqueous Liquids, and Wet Solids (sludge)	
Heat Release Rating:	16 Million Btu/hr.	

<b><u>Dimensions:</u></b>		
	<u>Primary Chamber</u>	<u>Secondary Chamber</u>
External length:	17.5 ft.	17.5 ft.
External diameter:	9 ft.	9 ft.
Internal diameter:	7 ft., 2 in.	7 ft., 2 in.
Cross-sectional area:	40.3 sq. ft.	40.3 sq. ft.

<b><u>Burners</u></b>		
	<u>Primary Chamber Burner</u>	<u>Secondary Chamber Burner</u>
Manufacturer:	North American	North American
Size:	12.0 Million Btu/hr.	6.0 Million Btu/hr.
Fuel:	Natural Gas	Natural Gas

Prime Mover:	Induced draft fan 15,000 acfm @ 400°F saturated, 22 in. water column.	
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Onyx Comprehensive Performance Test Plan

Table 2-2 Current AWFCO Parameters and Limits for Units 2 and 3

System	Device	Units	Control Limits	Calibration Frequency
Primary Combustion Chamber Temperature	Type K Thermocouple	°F	≤1,590 (one-minute average) <1,627 (HRA <sup>1</sup> ) ≥2,400 (instantaneous)	Annually
Secondary Combustion Chamber Temperature	Type K Thermocouple	°F	≤1,793 (one-minute average) <1,829 (HRA <sup>1</sup> ) ≥2,400 (instantaneous)	Annually
Primary Combustion Chamber pressure	Pressure transmitter	in. w.c.	≥ -0.1 (5 second delay)	Quarterly
Secondary Combustion Chamber pressure	Pressure transmitter	in. w.c.	≥ -0.1 (5 second delay)	Quarterly
Spray Dryer Adsorber Inlet Temperature	Type K Thermocouple	°F	N.A.	Annually
Spray Dryer Adsorber Outlet Temperature	Type K Thermocouple	°F	≥500 (one minute average)	Annually
Combustion Gas Flow Rate	Pitot Tube	acfm	≥17,198	Annually
Stack Gas Excess Oxygen	Zirconium Oxide fuel cell	%	< 3 (one-minute avg.)	Quarterly
Stack carbon monoxide	In-situ NDIR	ppmv	≥100 (HRA) ≥500 (one minute average)	Quarterly
Stack Hydrocarbon	FID/ In-situ NDIR	ppmv	≥10 (one minute average)	Quarterly
Stack gas opacity	In-situ NDIR	%	≥10 (one minute average)	Quarterly
Stack hydrogen chloride	In-situ NDIR	ppmv	≥100 (HRA) ≥500 (one minute average)	Quarterly
High BTU Liquid feedrate	Mass flow meter	lb/hr	≥ 2,012	Annually
Low BTU Liquid feedrate	Mass flow meter	lb/hr	≥ 1,993	Annually
Specialty feeder	Scale	lb/hr	≥ 724	Quarterly
Fabric filter pressure drop	Delta P transmitter	in. w.c.	≤ 2 or ≥ 10 (1 min. average)	Quarterly

<sup>1</sup> HRA means "hourly rolling average" as calculated by averaging the previous 60 one-minute average values.

Onyx Comprehensive Performance Test Plan

Table 2-3 Current AWFCO Parameters and Limits for Unit 4

System	Instrument	Units	Operating Limits	Calibration Frequency
Primary Combustion Chamber Temperature	Type K Thermocouple	°F	≤1,240 (one-minute average) ≤1,400 (HRA <sup>1</sup> ) ≥2,400 (instantaneous)	Annually
Secondary Combustion Chamber Temperature	Type K Thermocouple	°F	≤1,825 (one-minute average) ≤1,880 (HRA <sup>1</sup> ) ≥2,400 (instantaneous)	Annually
Primary Combustion Chamber pressure	Pressure transmitter	in. w.c.	≥ atmospheric (instantaneous)	Quarterly
Secondary Combustion Chamber pressure	Pressure transmitter	in. w.c.	≥ atmospheric (instantaneous)	Quarterly
Spray Dryer Adsorber Inlet Temperature	Type K Thermocouple	°F	≥ 1,200 (one minute average)	Annually
Spray Dryer Adsorber Outlet Temperature	Type K Thermocouple	°F	≥ 500 (one minute average)	Annually
Combustion Gas Flow Rate	Pitot Tube	acfm	≥ 43,000	Annually
Stack Gas Excess Oxygen	Zirconium Oxide fuel cell	%	≤ 3	Quarterly
Stack carbon monoxide	In-situ NDIR	ppmv	≥100 (HRA) ≥500 (one minute average)	Quarterly
Stack Hydrocarbon	FID/ In-situ NDIR	ppmv	≥10 (one minute average)	Quarterly
Stack gas opacity	In-situ NDIR	%	≥10 (one minute average)	Quarterly
Stack hydrogen chloride	In-situ NDIR	ppmv	≥100 (HRA) ≥500 (one minute average)	Quarterly
Liquid feedrate	Mass flow meter	lb/hr	≥ 1,700	Annually
Sludge feedrate	Mass flow meter	lb/hr	≥ 1,100	Annually
Drummed and Bulk Solids Feedrate	Scale	lb/hr	≥ 15,000	Quarterly
Baghouse low pressure drop	Delta P transmitter	in. w.c.	≤ 2	Quarterly
Baghouse highpressure drop	Delta P transmitter	in. w.c.	≥ 10	Quarterly

<sup>1</sup> HRA means "hourly rolling average" as calculated by averaging the previous 60 one-minute average values.

**CONTINUOUS EMISSIONS MONITORING SYSTEM  
QUALITY ASSURANCE PLAN**

Prepared for:

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Sauget, Illinois

Prepared by:

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Franklin, Tennessee

June 2004

## TABLE OF CONTENTS

1.0	INTRODUCTION AND BACKGROUND .....	1
1.1	DESCRIPTION OF CEMS .....	1
1.2	OVERVIEW OF REGULATORY REQUIREMENTS .....	2
2.0	CEMS CALIBRATIONS AND PERFORMANCE .....	5
2.1	DAILY DRIFT CHECKS .....	5
2.2	CALIBRATION .....	8
2.3	ABSOLUTE CALIBRATION AUDIT .....	10
2.4	INTERFERENCE RESPONSE TEST .....	10
2.5	RELATIVE ACCURACY TEST AUDIT .....	11
3.0	CEMS MAINTENANCE .....	14
3.1	DAILY SYSTEM AUDIT .....	14
3.2	SPARE PARTS INVENTORY .....	14
3.3	CALIBRATION GAS SUPPLY AND CERTIFICATION .....	15
3.4	CORRECTIVE ACTION FOR MALFUNCTIONING CEMS .....	17
4.0	INTEGRATION OF THE CEMS WITH THE AWFCO SYSTEM .....	18
4.1	EMISSION STANDARDS .....	18
4.2	DRIFT LIMITS .....	19
5.0	RECORDKEEPING AND QUALITY ASSURANCE REVIEWS .....	20
6.0	OPERATOR TRAINING AND CERTIFICATION .....	22

## INDEX OF TABLES

TABLE 1-1	REGULATORY REQUIREMENTS FOR THE CEMS QC PROGRAM AND THE CEMS QA PLAN.....	3
TABLE 2-1	OVERVIEW OF CEMS PERFORMANCE REQUIREMENTS .....	6
TABLE 3-1	SUMMARY OF CONCENTRATION REQUIREMENTS FOR CALIBRATION GASES.....	16

## LIST OF APPENDICES

APPENDIX A	CEMS DATA SHEETS AND CHECKLISTS
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## 1.0 INTRODUCTION

Onyx Environmental Services, Inc. (Onyx) owns and operates two fixed hearth incinerators (Units 2 and 3) and a transportable rotary kiln incinerator (Unit 4) at its facility located in Sauget, Illinois. These incinerators are subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Hazardous Waste Combustors (HWCs), codified in Title 40 of the Code of Federal Regulations (CFR), Part 63, Subpart EEE (§§63.1200 to 63.1214). The NESHAP for HWCs specifies emissions standards which reflect emissions performance of maximum achievable control technologies (MACT), and is commonly referred to as the HWC MACT.

For each incinerator, Onyx utilizes a continuous emissions monitoring system (CEMS) for demonstrating on-going compliance with the carbon monoxide (CO) and hydrogen chloride/chlorine (HCl/Cl<sub>2</sub>) emission standards. These CEMS are subject to the requirements of the Appendix to 40 CFR Part 63, Subpart EEE—*Quality Assurance Procedures for Continuous Emissions Monitors Used for Hazardous Waste Combustors*. This plan has been developed per the CEMS quality assurance (QA)/quality control (QC) requirements. Implementation of this plan will ensure that the CEMS generates, collects, and reports valid data that is precise, accurate, complete, and of a quality that meets the requirement of the HWC MACT Standard and the applicable performance specification.

### 1.1 Description of CEMS

Each incinerator is equipped with an EcoChem Analytics MC3 CEMS, which consists of the following major components:

- Heated stack sample probe
- Heated traced umbilical
- Heated sample pump
- EcoChem MC3 multicomponent infrared (IR) gas analyzer
- Zirconium oxide-based oxygen analyzer
- System controller and data acquisition system

Hot, wet stack gas is drawn through the heated stack sample probe and heat traced umbilical using a heated sample pump. The sampling location is downstream of the induced draft (ID) fan. The umbilical supplies instrument air to the filter probe to allow for automated periodic blowback. It also supplies calibration gases through the sampling system. The stack gas sample is maintained at approximately 185°C through the

sampling equipment and analyzer sample cell to prevent the removal of pollutants from the sample through contact with condensed moisture.

The sample cell consists of multiple mirrors that were adjusted and aligned at the factory to set the path length appropriate for the specific application. The MC3 multicomponent IR photometer uses a Gas Filter Correlation analytical technique to continuously monitor the stack gas concentrations of HCl and CO. The Single Beam Dual Wavelength analytical technique is used to continuously monitor stack gas water vapor (H<sub>2</sub>O) concentrations. A zirconium oxide-based oxygen analyzer is integrated with the MC3 to provide continuous monitoring of the stack gas oxygen (O<sub>2</sub>) concentrations.

A technical description and specification for the CEMS is presented in Section 2.0 of the MC3 *Operations Guide*. Section 2.1.1 documents the lowest range for each component and an accuracy of  $\pm 2\%$  of full-scale value. The lower threshold is 1% of the lowest range. These technical specifications document that the CEMS is capable of meeting the requirements of the Appendix to Part 63, Subpart EEE and Performance Specification 4B of 40 CFR Part 60, Appendix B.

The system controller controls the sampling system temperatures, purge/blowback, calibration checks, data handling, messaging, and alarms. The CEMS controller is integrated with the incinerator data acquisition system, automatic waste feed cutoff (AWFCO) system, and the main control system.

Units 2 and 3 incinerators are both equipped with a backup O<sub>2</sub> analyzer, and Unit 4 is equipped with two backup O<sub>2</sub> analyzers. These analyzers are zirconium oxide cells, COSA model ZFN-11YA1-2Z1. For Units 2 and 3, the backup O<sub>2</sub> analyzer is located in the common duct between the baghouse and the ID fan. The Unit 4 backup O<sub>2</sub> analyzers are located in the duct between the ID fan and the stack.

## 1.2 Overview of Regulatory Requirements

Cross-references and summaries of the applicable regulatory requirements are presented in Table 1-1. This table indicates the sections, tables, and figures of this document that address each particular requirement.

Table 1-1  
Regulatory Requirements for the CEMS QC Program and the CEMS QA Plan

Regulatory Reference: Appendix to Subpart EEE of Part 63	Description	CEMS QA Plan Section
Section 3.1.a.1	Checks for component failures, leaks, and other abnormal conditions	3.0 3.1
Section 3.1.a.2	Calibration of CEMS	2.2
Section 3.1.a.3	Calibration Drift determination and adjustment of CEMS	2.1, 2.2 Appendix A
Section 3.1.a.4	Integration of CEMS with the AWFCO system	4.0
Section 3.1.a.5	Preventive Maintenance of CEMS (including spare parts inventory)	3.0 Appendix A
Section 3.1.a.6	Data recording, calculations, and reporting	4.1 5.0
Section 3.1.a.7	Checks of record keeping	5.0
Section 3.1.a.8	Accuracy audit procedures, including sampling and analysis methods	2.3, 2.5 Appendix A
Section 3.1.a.9	Program of corrective action for malfunctioning CEMS	3.4
Section 3.1.a.10	Operator training and certification	6.0
Section 3.1.b	Reporting of excessive inaccuracies	5.0
Section 3.2.1	QA responsibilities	5.0
Section 3.2.2	Schedules for: (1) daily checks (2) periodic audits (3) preventive maintenance	(1) 3.0, 3.1 (2) 2.0, Table 2-1 (3) 3.0
Section 3.2.3	Check lists and data sheets	Appendix A
Section 3.2.4	Preventive maintenance procedures	3.0

Table 1-1 (Continued)  
Regulatory Requirements for the CEMS QC Program and the CEMS QA Plan

Regulatory Reference: Appendix to Subpart EEE of Part 63	Description	CEMS QA Plan Section
Section 3.2.5	Description of the media, format, and location of all records and reports	5.0
Section 3.2.6	Provisions for review of the CEMS data; revisions or updates of the QA plan based on review	5.0
Section 4.1	Check, record, quantify: (1) Zero Drift (2) Calibration Drift	2.1
Section 4.2	Recording Requirements for: (1) Zero Drift (2) Calibration Drift	2.1 Appendix A
Section 4.3	Daily System Audit	3.1
Section 4.4	Data recording and reporting	5.0
Section 5.1	Relative Accuracy Test Audit (RATA)	2.5
Section 5.2	Absolute Calibration Audit (ACA)	2.3
Section 5.3	Interference Response Test (IRT)	2.4
Section 5.4	Excessive audit inaccuracies	Table 2-1 2.3 2.5

## 2.0 CEMS CALIBRATIONS AND PERFORMANCE

The CEMS must be operated, calibrated, and maintained to ensure conformance with the Appendix to Part 63, Subpart EEE and the EPA Performance Specification 4B (PS 4B). Calibration drift checks and performance demonstrations are performed periodically on the CEMS based on the following schedule:

- Daily calibration checks for determination of Calibration Drift (CD) and Zero Drift (ZD).
- Quarterly Absolute Calibration Audit (ACA) for determining calibration error (CE) for O<sub>2</sub>, CO, and HCl.
- Annual Relative Accuracy Test Audit (RATA) for determining the CEMS relative accuracy (RA) for CO emissions.

The procedures, QC criteria, corrective actions, and recordkeeping associated with these drift checks and audits are described in this section. A summary of the QC criteria and corrective actions is presented in Table 2-1. Blank data sheets are provided in Appendix A.

### 2.1 Daily Drift Checks

Daily drift checks are automatically initiated by the CEMS controller. During the automated calibration sequence, calibration gases are injected from pressurized cylinders through the sampling system. The sequence starts with the IR analyzer zero gas that is free of any of the constituents analyzed by the IR analyzer. This zero gas may also serve as the span gas for the integrated O<sub>2</sub> analyzer. The zero gas flows through the system with enough time allowed for the analyzer to fully respond to the gas. Then the analyzer response to the zero gas is recorded for one minute and averaged. The next calibration gas in the calibration sequence is the first IR analyzer span gas. This span gas is a calibration standard that has one or more constituent concentrations at the analyzer span value (this gas may also be used as the zero gas for the O<sub>2</sub> analyzer). The first span gas flows through the system to allow the analyzer enough time to fully respond to the gas. Then the analyzer response to the first span gas is recorded for one minute and averaged. This is then repeated for the second span gas and then possibly a third span gas depending upon the composition of the span gases. The total duration of this calibration sequence has been designed to not exceed the 20 minute maximum allowable CEMS downtime while burning hazardous waste.

Table 2-1  
Overview of CEMS Performance Requirements

Analyzer Parameter (Span Value)	QC Parameter	Minimum Frequency	QC Limit	Corrective Action
H <sub>2</sub> O (60%)	ZD	Daily	±2% of span	Zero Adjustment
O <sub>2</sub> (25%)	ZD and CD	Daily	±0.5% O <sub>2</sub>	Zero/Span Adjustment
	CD	Daily	±1.0% O <sub>2</sub>	Shut off waste, service/calibrate, conduct ACA
	Cumulative Span Adjustment	Per Adjustment	±1.5% O <sub>2</sub>	Shut off waste, service/calibrate, conduct ACA
	CE	Quarterly <sup>1</sup>	0.5% O <sub>2</sub>	Shut off waste, service/calibrate, conduct RATA
	RA	Annually	1.0% O <sub>2</sub>	Shut off waste, service/calibrate, repeat RATA
CO (200 ppm)	ZD and CD	Daily	±3% of span	Zero/Span Adjustment
	CD	Daily	±5% of span for 6 out of 7 day	Shut off waste, service/calibrate, conduct ACA
	CD	Daily	±6% of span	Shut off waste, service/calibrate, conduct ACA
	Cumulative Span Adjustment	Per Adjustment	±9% of span	Shut off waste, service/calibrate, conduct ACA
	CE	Quarterly <sup>1</sup>	5%	Shut off waste, service/calibrate, conduct RATA
	RA <sup>2</sup>	Annually	5 ppm <sub>dv</sub> @ 7% O <sub>2</sub> (See Section 2.5)	Shut off waste, service/calibrate, conduct RATA

<sup>1</sup> The ACAs for determining the O<sub>2</sub> and CO CE are conducted quarterly, except in a quarter when a RATA is conducted instead.

<sup>2</sup> The RA accuracy for CO is based on the units of the CO emission standard (ppm<sub>dv</sub> @ 7% O<sub>2</sub>). CO data collected from the analyzer during the RATA will include low and or high range values per the normal operating requirements.

Table 2-1 (continued)  
Overview of CEMS Performance Requirements

Analyzer Parameter (Span Value)	QC Parameter	Minimum Frequency	QC Limit	Corrective Action
CO (3000 ppm)	ZD and CD	Daily	±3% of span	Zero/Span Adjustment
	CD	Daily	±5% of span for 6 out of 7 day	Shut off waste, service/calibrate, conduct ACA
	CD	Daily	±6% of span	Shut off waste, service/calibrate, conduct ACA
	Cumulative Span Adjustment	Per Adjustment	±9% of span	Shut off waste, service/calibrate, conduct ACA
	CE	Quarterly <sup>3</sup>	5%	Shut off waste, service/calibrate, conduct RATA
HCl (1000 ppm)	ZD and CD	Daily	±3% of span	Zero/Span Adjustment
	CD	Daily	±5% of span for 6 out of 7 day	Shut off waste, service/calibrate, conduct ACA
	CD	Daily	±6% of span	Shut off waste, service/calibrate, conduct ACA
	Cumulative Span Adjustment	Per Adjustment	±9% of span	Shut off waste, service/calibrate, conduct ACA
	CE	Quarterly <sup>4</sup>	5%	Shut off waste, service/calibrate, conduct ACA

<sup>3</sup> The ACAs for determining the O<sub>2</sub> and CO CE are conducted quarterly, except in a quarter when a RATA is conducted instead.

<sup>4</sup> A RATA for HCl may be performed annually in lieu of performing an ACA in that quarter.

The drift for each stack gas constituent is determined as the difference between the known constituent concentration in the calibration gas and the analyzer reading. ZD is the drift determined using zero gas. CD is the drift determined using span gases. ZD and CD are determined daily for O<sub>2</sub>, CO, and HCl. ZD for H<sub>2</sub>O is also determined daily.

The ZD and CD are recorded by the CEMS datalogger as a percent of full-scale deviation (Dev%). Given that the "span value" is equal to the "full-scale" value, Dev% is calculated as follows:

$$Dev\% = |Drift\%|$$

$$Drift\% = \frac{\text{reference concentration} - \text{analyzer response}}{\text{span value}} \cdot 100$$

For CO and O<sub>2</sub>, if Dev% for CD exceeds the limits specified in the applicable Performance Specifications in 40 CFR Part 60, Appendix B, the analyzer must be calibrated. If the Dev% for CD is greater than the preset tolerance (Tol%) the instrument technician will notify the incinerator operator and waste feeds will be shut off until corrective measures have been taken. The CD tolerances for both O<sub>2</sub> and CO have been set at the two times the performance specification limits. A calibration failure alarm indicates that the analyzer is out-of-control and must be serviced and recalibrated. An ACA must be conducted to document that the analyzer is within the performance specifications prior to resuming hazardous waste burning.

For CO, if the Dev% for CD is greater than 5% for 6 out of 7 days, then the analyzer is out-of-control and must be serviced and recalibrated. An ACA must be conducted to document that the analyzer is within the performance specifications prior to resuming hazardous waste burning.

Similar requirements for drift limits apply to HCl, except that no performance specifications have been promulgated for CEMS monitoring these parameters. In lieu of limits specified by an EPA Performance Specification, Onyx has developed self-imposed performance specification limits for HCl. These limits are specified in Table 2-1.

## 2.2 Calibration

Calibration of the analyzer will be conducted periodically to ensure that the results of drift checks, ACAs, or RATAs meet the applicable performance specifications. Calibration for each IR channel (H<sub>2</sub>O, CO, and HCl) may be performed daily during the

automated calibration sequence used to determine calibration drift. For each calibration gas used during the automated sequence, the automatic calibration will reset the analyzer response to correspond with the known reference concentrations. Any automated calibration adjustment will be made immediately after the analyzer response to the calibration gas is recorded electronically. The drift determined immediately prior to a calibration adjustment is equal to the magnitude of the adjustment. The oxygen analyzer uses a two-point calibration curve. The first calibration point resets the measured concentration of air to 20.94%. The second calibration point resets the measured concentration of a low concentration calibration gas to its known concentration. This calibration is performed manually. To document the calibration adjustment, the actual measurement at each calibration point prior to adjustment will be recorded.

Following service to the MC3 analyzer that could affect its calibration, each IR channel, and the O<sub>2</sub> analyzer will be calibrated. The CEMS Drift and Calibration Data Sheet in the Appendix to this document will be used to track the cumulative span adjustments (i.e., change in the calibration factor). Section 5.5 of the MC3 CEMS *Operations Guide* and Section 4.4 of the MC3 CEMS *System Guide* should be referred to as needed for additional detail regarding calibration of the CEMS.

If the cumulative calibration adjustment for CD is three times the performance specification limits at any time, hazardous waste burning will be cutoff. The analyzer will be serviced, recalibrated, and an ACA will document that hazardous waste burning can recommence. A calibration factor that has been verified through an ACA will become the new reference point for assessing the cumulative adjustments made to correct for calibration drift.

The incinerator can remain on hazardous waste during CEMS drift checks, calibrations, purges, and corrective actions for CEMS failures provided that the CEMS downtime does not exceed 20 minutes. During these times, the instantaneous values used to determine one-minute averages of dry, oxygen corrected concentrations of CO and HCl are discarded. This allowance is provided by Section 6.2 and 6.5.1 of the Appendix to Subpart EEE. The applicable regulatory requirements do not limit the frequency that this allowance can be utilized. Typically, this allowance will only be utilized once per day for the daily drift checks. Since the oxygen analyzer cannot be calibrated during the automatic calibration of the IR channels, calibration of the oxygen analyzer will require additional downtime. If there is a CEMS failure, the incinerator may remain on hazardous waste provided that the CEMS can be restored within 20 minutes.

Following downtime, the CEMS must be within the performance specifications described in this document. Otherwise, hazardous waste burning will cease until the appropriate corrective measures can be taken. To ensure that the hourly rolling averages (HRAs) for CO and HCl are representative of current operating conditions, CEMS data validity must be at least 75% (i.e., 60 valid one minute averages per 80 minutes of normal operations).

### 2.3 Absolute Calibration Audit

An ACA is conducted quarterly for O<sub>2</sub>, CO (high and low range), and HCl. For O<sub>2</sub> and CO, an ACA is not conducted in the quarter that the required annual RATA is performed. The ACA is conducted according to the calibration error (CE) test procedure described in the Performance Specifications 4B. During the ACA, the analyzer is challenged over each range with EPA Protocol 1 cylinder gases. The EPA Protocol 1 cylinder gases are NIST traceable calibration standards. For a given parameter, the analyzer response is recorded at three measurement points. This is then repeated twice to give three sets of data. The CE at each measurement point is determined as follows:

$$CE = \left| \frac{d}{FS} \right| \cdot 100\%$$

where d is the mean difference between the CEMS response and the known reference concentration and FS is the span value.

For CO and HCl, the CE determined at each measurement point cannot exceed 5%. For O<sub>2</sub>, CE cannot exceed 2%. If an ACA fails to pass the QC criterion (i.e., the audit indicates excessive inaccuracy), then hazardous waste burning cannot resume until corrective measures have been taken and a RATA demonstrates that the CEMS is operating within the performance specifications.

Unless the US EPA specifies performance specifications for HCl CEMS and requires a RATA, an ACA for HCl will be sufficient to ensure HCl data accuracy. A RATA for HCl may be performed annually in lieu of performing an ACA in that quarter.

### 2.4 Interference Response Test

The MC3 analyzer corrects for interferences using additive and multiplicative interference tables. These tables were generated per the manufacturer's procedure at the initial setup of the CEMS system. An Interference Response Test (IRT) is listed in the

Appendix to Subpart EEE, however, the Performance Specification 4B does not include requirements or acceptance criteria for an interference response test. Onyx will perform Interference Response Tests at such time as US EPA specifies the test procedures and acceptable criteria for an Interference Response Test.

## 2.5 Relative Accuracy Test Audit

The Relative Accuracy Test Audit (RATA) is required annually for O<sub>2</sub> and CO CEMS. The Relative Accuracy (RA) test procedures required by Section 7.2 of PS 4B references incorrect sections of PS 3 (for O<sub>2</sub>) and PS 4A (for CO). The applicable sections of the performance specifications are:

- RATA procedures: Sections 8.4.3 through 8.4.5 of PS 2.
- O<sub>2</sub> reference methods: Section 8.2 of PS 3
- CO reference methods: Section 8.2 of PS 4A.
- O<sub>2</sub> RA calculations: Section 12.0 of PS 3
- CO RA calculations: Section 12.0 of PS 2
- O<sub>2</sub> RA criterion: Section 13.2 of PS 3
- CO RA criteria: Section 13.2 of PS 4A

A brief summary of the applicable reference methods are provided below:

### US EPA Method 3/3A (Stack Gas Composition and Molecular Weight)

The sampling and analytical procedures outlined in this method will be used to determine the O<sub>2</sub> composition of the stack gas during the RATA. Using this method, a gas sample is extracted from the stack at a constant rate for determination of O<sub>2</sub>, CO<sub>2</sub> and molecular weight. The integrated gasbag collection option will be employed. The gasbags will be analyzed using an Orsat analyzer. As an alternative, the Method 3A (instrumental analyzer) method may be used for analysis of the sample.

### US EPA Method 4 (Stack Gas Moisture Content)

If necessary, the sampling and analytical procedures outlined in this method will be used to determine the moisture content of the stack gas during the RATA. Using this method, a gas sample is extracted from the stack. The gas passes through a series of impingers that contain reagents. The impingers are connected in series and are contained in an ice bath in order to assure condensation of the moisture in the gas stream. Any moisture that is not condensed in the impingers is captured in the silica gel, ensuring that all moisture can be weighed and entered into moisture calculations.

#### US EPA Method 10 (Carbon Monoxide CEMS)

A continuous emissions monitor will be used to continuously sample exhaust gas for carbon monoxide analysis as described in EPA Method 10. Using this method, a continuous gas sample is extracted from the exhaust gas, and is analyzed for carbon monoxide (CO) using a Luft-type Non-Dispersive Infrared Analyzer (NDIR), or another equivalent analyzer. This sampling and analysis will occur continuously throughout the duration of each run of the RATA.

During a test run of the RATA, US EPA reference methods are utilized to obtain stack gas data. These data are used to calculate the stack gas dry O<sub>2</sub> concentration and the stack gas CO concentration corrected to seven percent oxygen in units of parts per million, dry volume (i.e., in the units of the emission standard, 100 ppm<sub>dv</sub> CO @ 7% O<sub>2</sub>). The average stack gas O<sub>2</sub> (% dry) and CO (ppm<sub>dv</sub>, @ 7% O<sub>2</sub>) concentrations—as calculated from the installed CEMS over the duration of the run—are compared to the value obtained using the reference methods. The RATA consists of a minimum of 9 test runs. If more test runs are conducted, at least 9 data sets will be used to determine RA, and no more than three sets of data will be rejected. The O<sub>2</sub> and CO RA calculations and acceptance criteria are presented below.

$$RA_{\text{oxygen}} = |\bar{d}| \leq 1.0\% \text{ O}_2, \text{ dry}$$

$$RA_{\text{CO}} = \left\{ \begin{array}{l} \frac{|\bar{d}| + |CC|}{\overline{RM}} \cdot 100\% \leq 10\% \dots \text{for } \overline{RM} \geq 50 \text{ ppm}_{\text{dv}} @ 7\% \text{ O}_2 \\ |\bar{d}| + |CC| \leq 5 \text{ ppm}_{\text{dv}} @ 7\% \text{ O}_2 \dots \text{for } \overline{RM} < 50 \text{ ppm}_{\text{dv}} @ 7\% \text{ O}_2 \end{array} \right\}$$

where,

$$\bar{d} = \frac{1}{n} \cdot \sum_{i=1}^n (RM_i - CEMS_i)$$

$n$  = number of test runs

$RM_i$  = the concentration determined by the reference method for the  $i^{\text{th}}$  test run

$CEMS_i$  = the concentration determined by the CEMS for the  $i^{\text{th}}$  test run

$CC$  = the 2.5 percent error confidence coefficient (see Section 12.4 of PS 2)

If a RATA fails to pass the QC criterion (i.e., the audit indicates excessive inaccuracy), then hazardous waste burning cannot resume until corrective measures have been taken and a RATA demonstrates that the CEMS is operating within the performance specifications. If CO emission levels are significantly low, it may be difficult to produce meaningful results using the RA test procedure. Under these circumstances, Onyx will request approval to utilize the Alternative RA Procedure prescribed by Section 7.3 of PS 4B.

### 3.0 CEMS MAINTENANCE

Onyx has developed a preventative maintenance program for the CEMS. This program includes frequent inspections of the CEMS in order to identify potential component failures, leaks, and data quality issues. The CEMS preventative maintenance program also includes scheduled replacement of critical components and maintenance of spare parts inventory. All scheduled and unscheduled maintenance of the CEMS will be documented in a CEMS logbook maintained for each incinerator. Section 8.0 of the MC3 CEMS *Operations Guide* provides details for daily, weekly, monthly, quarterly, and annual inspection and maintenance activities. Procedures and recordkeeping for the specific inspection and maintenance activities are described below.

#### 3.1 Daily System Audit

The Daily System Audit includes:

- Review of the daily drift check data
- Inspection of the recording system
- Check for controller alarms and error/warning messages
- Check expected calibration values
- Check of current data status
- Check of calibration gas cylinder pressures
- Check calibration gas pressure regulator settings
- Inspection of the instrument air pressure
- Inspection of the stack gas sampling system

The Daily System Audit Checklist will be used to document the findings from the daily system audit. A CEMS Drift and Calibration Data Sheet will be completed during the daily system audit in order to track and evaluate drift and adjustments made to the CEMS.

#### 3.2 Spare Parts Inventory

CEMS spare parts are maintained in sufficient quantities on-site to perform routine maintenance activities. It is anticipated that these spare parts and typical maintenance supplies will be adequate to service the CEMS. Some services and replacement of components must be performed by an EcoChem Analytics Service Engineer to avoid violation of the system certification.

The following consumable parts have been targeted for periodic inspection and replacement for maintaining the CEMS:

- Air conditioner filters for CEMS shelter
- Instrument air coalescing filters
- Sample pump Teflon diaphragm
- Sample pump Teflon flapper valve
- Sample probe internal filter
- Sample probe gaskets
- Probe-tip filter

The following spare parts are not part of routine maintenance and would be replaced by an EcoChem Service Engineer:

- Cell front cover gasket
- Cell inlet filter
- Cell windows with o-ring gaskets
- Cell mirrors

The CEMS Calibration Gas and Spare Parts Log is provided in Appendix A and will be used as needed to keep track of inventory.

### 3.3 Calibration Gas Supply and Certification

A summary of the calibration gases needed to perform the daily drift checks, calibrations, and ACAs is presented in Table 3-1. The number of gas cylinders maintained on-site depends on the specific mixture of gases in each cylinder and the lead time required for placing orders. An inventory of calibration gases will be conducted in conjunction with the spare parts inventory to ensure that the appropriate gases are available for use. Certification from the supplier of calibration gas quality will be kept with the most recent spare parts inventory documentation.

Each calibration sequence depletes approximately 40 psi, and a cylinder with less than 150 psi should be replaced. The daily system audit includes inspection of the calibration gas cylinder pressures and will be used to track usage and to predict when to reorder.

**Table 3-1**  
**Summary of Concentration Requirements for Calibration Gases**

Constituent	QC Parameter	Concentration Requirement	Accuracy
H <sub>2</sub> O	ZD	0%	per gas supplier
O <sub>2</sub>	ZD	0%	per gas supplier
	CD	25%	per gas supplier
	ACA	0-2%	EPA Protocol 1/NIST Traceable
	ACA	8-10%	EPA Protocol 1/NIST Traceable
	ACA	14-16%	EPA Protocol 1/NIST Traceable
CO (low range)	ZD	0 ppm	per gas supplier
	CD	200 ppm	per gas supplier
	ACA	0-40 ppm	EPA Protocol 1/NIST Traceable
	ACA	60-80 ppm	EPA Protocol 1/NIST Traceable
	ACA	140-160 ppm	EPA Protocol 1/NIST Traceable
CO (high range)	ZD	0 ppm	per gas supplier
	CD	3000 ppm	per gas supplier
	ACA	0-600 ppm	EPA Protocol 1/NIST Traceable
	ACA	900-1200 ppm	EPA Protocol 1/NIST Traceable
	ACA	2100-2400 ppm	EPA Protocol 1/NIST Traceable
HCl	ZD	0 ppm	per gas supplier
	CD	1000 ppm	per gas supplier
	ACA	0-200 ppm	EPA Protocol 1/NIST Traceable
	ACA	300-400 ppm	EPA Protocol 1/NIST Traceable
	ACA	700-800 ppm	EPA Protocol 1/NIST Traceable

### 3.4 Corrective Action for Malfunctioning CEMS

It is Onyx's policy to minimize the occurrence of malfunctions by taking a proactive approach to facility maintenance. Proactive measures include the preventive maintenance described in this section, and the calibration and performance testing described in Section 2.0. Frequent inspections and availability of spare parts allow for the timely completion of as needed service to the CEMS prior to a major malfunction.

Operating and maintaining the incinerator during a malfunction will be conformance with the *Startup, Shutdown, and Malfunction Plan* (SSMP). Attachment 4 to the SSMP is the *Program of Corrective Action for Malfunctions*. Section 9.2 of the *Program of Corrective Action for Malfunctions* addresses corrective actions for malfunctioning CEMS. Section 9.0 through 9.2 of the MC3 CEMS *Operations Guide* may be referred to as needed for troubleshooting and corrective maintenance of the CEMS.

#### 4.0. INTEGRATION OF THE CEMS WITH THE AWFCO SYSTEM

The CEMS is integrated with the automatic waste feed cutoff (AWFCO) system to assure on-going compliance with CO and HCl/Cl<sub>2</sub> emission standards. The AWFCO system is designed to immediately and automatically shut off all waste to the incinerator in the event of an exceedance of an emission or operating limit. The CEMS is integrated with AWFCO system through interlocks. These interlocks are conditions which trigger a relay causing the AWFCO system to activate. This section describes the AWFCO interlocks associated with the CEMS.

#### 4.1 Emission Standards

The CEMS raw data for O<sub>2</sub> (% vol), H<sub>2</sub>O (% vol), CO (ppmv), and HCl (ppmv) consists of instantaneous value which have not been smoothed or averaged, evaluated once every 15 seconds. These values are used to calculate CO and HCl emissions in the units of emission standards. Calculations equivalent to the following procedures are performed to compare the stack gas emissions to the CO and HCl emission standards.

First 15-second data in the units of the emission standards are calculated:

$$CO @ 7\% O_2, ppmv = \frac{CO, ppmv}{100\% - (H_2O, \%)} \cdot \left( \frac{14\%}{21\% - \frac{O_2, \%}{100\% - (H_2O, \%)}} \right)$$

$$HCl @ 7\% O_2, ppmv = \frac{HCl, ppmv}{100\% - (H_2O, \%)} \cdot \left( \frac{14\%}{21\% - \frac{O_2, \%}{100\% - (H_2O, \%)}} \right)$$

The HCl emission must be compared to an HCl/Cl<sub>2</sub> emission standard. Onyx has demonstrated through emissions testing that the ratio of HCl to Cl<sub>2</sub> emissions is 15:1. Applying this ratio, the following equation illustrates that a maximum stack gas HCl concentration limit of 68 ppmv @ 7% O<sub>2</sub> is equivalent to the Interim HWC MACT HCl standard of 77 ppmv @ 7% O<sub>2</sub>.

$$\begin{aligned}
\text{HCl/Cl}_2 @ 7\% \text{ O}_2, \text{ppmdv} &= \text{HCl} @ 7\% \text{ O}_2, \text{ppmdv} + 2 \cdot \text{Cl}_2 @ 7\% \text{ O}_2, \text{ppmdv} \\
&= \text{HCl} @ 7\% \text{ O}_2, \text{ppmdv} + 2 \cdot \frac{1}{15} \cdot \text{HCl} @ 7\% \text{ O}_2, \text{ppmdv} \\
&= \frac{17}{15} \text{HCl} @ 7\% \text{ O}_2, \text{ppmdv}
\end{aligned}$$

$$\begin{aligned}
\text{HCl} @ 7\% \text{ O}_2, \text{ppmdv} &= \left( \frac{15}{17} \right) \cdot 77 \text{ppmdv HCl/Cl}_2 @ 7\% \text{ O}_2 \\
&= 68 \text{ppmdv HCl} @ 7\% \text{ O}_2
\end{aligned}$$

The calculated 15-second data are then used to calculate one-minute averages (OMAs). The current minute OMA is averaged with the previous 59 OMAs to generate an hourly rolling average (HRA). All rounding is avoided for the numbers used to calculate HRAs. The HRAs of CO and HCl emissions are rounded to two significant figures.

If the HRA CO emission concentration exceeds the CO emission standard of 100 ppmv @ 7% O<sub>2</sub>, an AWFCO will occur. If the HRA HCl emission concentration exceeds 68 ppmv @ 7% O<sub>2</sub>, an AWFCO will occur.

#### 4.2 Drift Limits

As described in Section 2.1, waste feeds will be manually shut off in case a drift limit is exceeded. For CO and O<sub>2</sub>, drift limits are equal to 2 times the performance specifications. Comparable drift limits have been established for excessive H<sub>2</sub>O and HCl drift.

## 5.0. RECORDKEEPING AND QUALITY ASSURANCE REVIEWS

Documentation generated from CEMS QA/QC procedures and monitoring will be kept on-site for a period of five years. The data and documentation that is generated and reviewed is kept in various locations at the Onyx facility. Table 6-1 below lists the storage location and format of this documentation.

Maintenance and Instrument Technicians have the primary responsibility for creating and organizing CEMS data sheets, daily system audit checklists, maintenance logbook, and spare part inventory records. The Environmental Engineer/Specialist or designee will check these records quarterly to verify completion and organization. This review will also consider the following requirements:

1. Whenever excessive audit inaccuracies occur for two consecutive quarters, the current written procedures will be revised or the CEMS modified or replaced to correct the deficiency causing the excessive inaccuracies. Previous versions of written procedures will be kept on record and made available for inspection.
2. If the ZD and/or CD exceed(s) two times the limits in the Performance Specifications, or if the cumulative adjustment to the ZD and/or CD exceed(s) three times the limits in the Performance Specifications, the CEMS is considered "out-of-control" (as defined in 40 CFR 63.8(c)(7)), and the event will be reported in the facility's semi-annual "Excess Emissions and CMS Performance Report". Further detail on this report can be found in the facility CMS Quality Assurance Program.

On an annual basis the Environmental Engineer/Specialist or designee will review all CEMS data generated for the previous 12 months and prepare a brief internal report/memo summarizing findings. Based on this review, the Environmental Engineer/Specialist or designee will solicit recommendations for revisions to the CEMS Quality Assurance Plan. The CEMS Quality Assurance Plan will be revised as needed to maintain QA/QC of the CEMS. All versions of this plan for the last five years remain in the operating record.

Table 5-1 CEMS Records and Reports

Record/Report	Storage Location	Media/Format <sup>1</sup>
CEMS QA Plan - Current Version - Previous Version	Incinerator Manager's Office Operating Records Archives	HD and/or P RD
CEMS Readings and HRA - Previous year through year to date - Remaining archives	Data Historian Operating Records Archives	HD and/or RD RD
Drift and Calibration Data: - Previous year through year to date - Remaining archives	Operating Records Archives	P and/or RD
Absolute Calibration Audit - Previous year though year to date - Remaining archives	Operating Record Archives	P and/or RD
Relative Accuracy Test Audit - Previous year through year to date - Remaining archives	Operating Record Archives	P and/or RD
Daily System Audit - Previous year through year to date - Remaining archives	Operating Record Archives	P and/or RD
Preventive Maintenance Logbook - Previous year through year to date - Remaining archives	Operating Records Archives	P and/or RD
Spare Parts Inventory - Previous year through year to date - Remaining archives	Operating Records Archives	P and/or RD
Annual Review of CEMS Data	Operating Records Archives	P and/or HD and/or RD

<sup>1</sup> Media Format:

HD - Computer or network hard drive

RD - Removable drive (floppy, CD, backup tape)

P - Paper documentation

## 6.0 OPERATOR TRAINING AND CERTIFICATION

Training is provided to Onyx employees on the basis of their job title. Individuals specifically involved in the operation of the incinerator and associated CEMS are the Instrument Technicians, Incinerator Operators, and Environmental Engineer/Specialist. The Onyx operator training and certification program meets the requirements outlined in 40 CFR 63.1206(c)(6). Documentation of employee training and certification is kept with the Training Director, and is available for review upon request.

APPENDIX A

CEMS DATA SHEETS AND CHECKLISTS

NOTE: THE FOLLOWING SHEETS ARE FOR EXAMPLE PURPOSES ONLY.  
ONYX MAY UTILIZE EQUIVALENT DOCUMENTATION FOR ANY OF THE  
SHEETS INCLUDED.

# CEMS DRIFT AND CALIBRATION DATA SHEET

Parameter (Span Value)	Date & Time	Concentration		Drift %	Adjustment %	Cumulative Adjustment %
		Reference	Analyzer			
H <sub>2</sub> O (60 %)						
Zero						
O <sub>2</sub> (25%)						
Zero						
Calibration						
CO (200 ppm)						
Zero						
Calibration						
CO (3000 ppm)						
Zero						
Calibration						
HCl (1000 ppm)						
Zero						
Calibration						

$$\text{Drift \%} = \frac{\text{Reference} - \text{Analyzer}}{\text{Span Value}} \cdot 100\%$$

Adjustment % = Drift % (if zero/span was reset during drift check)

$$\text{Cumulative Adjustment \%} = (\text{Previous Cumulative Adjustment \%}) + (\text{Current Adjustment \%})$$

\_\_\_\_\_  
(Name & Title)

\_\_\_\_\_  
(Signature)

**ABSOLUTE CALIBRATION AUDIT (ACA)  
DATA SHEET**

<b>Parameter</b>  <input type="checkbox"/> O <sub>2</sub> <input type="checkbox"/> CO-low range <input type="checkbox"/> CO-high range <input type="checkbox"/> HCl	<b>NIST Traceable Calibration Standards</b>			
	<b>Gas</b>	<b>Concentration</b>		
	Low (Zero)		±	
	Mid		±	
	High		±	

RUN NUMBER	Concentration		Difference		
	Reference	Analyzer	Low	Mid	High
1 - Low				--	--
2 - Mid					--
3 - High			--	--	
4 - Low				--	--
5 - Mid			--		--
6 - High			--	--	
7 - Low				--	--
8 - Mid			--		--
9 - High			--		
MEAN DIFFERENCE =					
CALIBRATION ERROR =			%	%	%

$$\text{Calibration Error} = \frac{\text{Mean Difference}}{\text{Span Value}} * 100$$

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Date)

**RELATIVE ACCURACY TEST AUDIT RATA  
DATA SHEET**

Run	Reference Method			CEMS	Difference	Reference Method			CEMS	Difference
	H <sub>2</sub> O, % (if applicable)	O <sub>2</sub> , % wet (if applicable)	O <sub>2</sub> , % dry	O <sub>2</sub> , % dry	O <sub>2</sub> , % dry	CO ppmv (if applicable)	CO ppmv	CO ppmv @ 7% O <sub>2</sub>	CO ppmv @ 7% O <sub>2</sub>	CO ppmv @ 7% O <sub>2</sub>
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
			O <sub>2</sub> RA						Mean Difference	
									Standard Deviation	
									Confidence Coefficient	
									CO RA	

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)

# CEMS DAILY SYSTEM AUDIT

Initials

Verify that the most recent drift checks and calibration adjustments are within limits. Complete Drift and Calibration Data Sheet. Corrective Actions:	
Verify proper operation of CEMS data recording and printing Corrective Actions:	
Check for controller alarms and error/warning messages Corrective Actions:	
Check expected calibration values Corrective Actions:	
Check current emissions data status Corrective Actions:	
Verify calibration gas cylinder pressures (>150 psi) Corrective Actions:	
Verify pressure regulator settings (approximately 25-35 psi) Corrective Actions:	
Verify proper instrument air pressure to CEMS umbilical Corrective Actions:	
Perform visual inspection of the stack gas sampling system Corrective Actions:	

(Name)

(Title)

(Signature)

(Date)

## CEMS CALIBRATION GAS AND SPARE PARTS LOG

### CALIBRATION GASES:

(Attach all certification forms)

Zero gas: \_\_\_\_\_ cylinders Composition: \_\_\_\_\_

Span gas 1: \_\_\_\_\_ cylinders Composition: \_\_\_\_\_

Span gas 2: \_\_\_\_\_ cylinders Composition: \_\_\_\_\_

Span gas 3: \_\_\_\_\_ cylinders Composition: \_\_\_\_\_

ACA Gases: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### PARTS:

Air conditioner filters for CEMS shelter \_\_\_\_\_

Instrument air coalescing filters \_\_\_\_\_

Sample pump Teflon diaphragm \_\_\_\_\_

Sample pump Teflon flapper valve \_\_\_\_\_

Sample probe internal filter \_\_\_\_\_

Sample probe gaskets \_\_\_\_\_

Probe-tip filter \_\_\_\_\_

Cell front cover gasket \_\_\_\_\_

Cell inlet filter \_\_\_\_\_

Cell windows with o-ring gaskets \_\_\_\_\_

Cell mirrors \_\_\_\_\_

Tubing \_\_\_\_\_

Fittings \_\_\_\_\_

Solenoid Valves \_\_\_\_\_

Thermocouples \_\_\_\_\_

Electronic parts \_\_\_\_\_

\_\_\_\_\_

Other spare parts \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Inventory taken by: \_\_\_\_\_

Date: \_\_\_\_\_

**CONTINUOUS MONITORING SYSTEM  
QUALITY CONTROL PROGRAM**

Prepared for:

Onyx Environmental Services, Inc.  
Sauget, Illinois

Prepared by:

Franklin Engineering Group, Inc.  
Franklin, Tennessee

June 2004

## TABLE OF CONTENTS

1.0	INTRODUCTION AND BACKGROUND .....	1
1.1	SUMMARY OF FACILITY INFORMATION .....	4
1.1.1	<i>Fixed Hearth Incinerators</i> .....	4
1.1.2	<i>Rotary Kiln Incinerator</i> .....	5
1.2	CMS INSTRUMENTATION .....	6
2.0	CMS CALIBRATION AND PREVENTIVE MAINTENANCE .....	13
2.1	CMS CALIBRATION .....	13
2.1.1	<i>Initial CMS Calibration</i> .....	13
2.1.2	<i>Subsequent CMS Calibration</i> .....	13
2.1.3	<i>CEMS Calibration Audits and Calibration</i> .....	14
2.2	CMS CALIBRATION AUDITS .....	14
2.3	PREVENTIVE MAINTENANCE .....	19
3.0	CMS RECORDKEEPING AND REPORTING .....	20
3.1	RECORDKEEPING .....	20
3.2	REPORTING .....	21
4.0	CMS CORRECTIVE ACTIONS .....	24

## INDEX OF TABLES

TABLE 1-1	REGULATORY CHECKLIST FOR THE CMS QA PROGRAM .....	2
TABLE 1-2	CMS INSTRUMENT SPECIFICATIONS .....	7
TABLE 2-1	CMS CALIBRATION AUDIT REQUIREMENTS .....	15
TABLE 3-1	REPORTING REQUIREMENTS .....	23

## 1.0 INTRODUCTION AND BACKGROUND

Onyx Environmental Services, Inc. (Onyx) owns and operates two fixed hearth incinerators (Units 2 and 3) and a rotary kiln incinerator (Unit 4) at its facility located in Sauget, Illinois. The incinerators are subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Hazardous Waste Combustors (HWC), codified as 40 CFR, Part 63, Subpart EEE (§ 63.1200 to § 63.1213). The NESHAP specifies emissions standards which reflect emissions performance of Maximum Achievable Control Technologies (MACT), and is commonly referred to as the HWC MACT.

Hazardous waste combustors are required [per § 63.8(d)(2)] to establish and implement a Continuous Monitoring System (CMS) Quality Control (QC) Program. The purpose of the QC Program is to outline procedures used to verify that the CMS are properly installed, calibrated, and collecting accurate data on an ongoing basis. The CMS performance evaluation test plan was submitted as part of the Comprehensive Performance Test Plan.

The QC Program demonstrates Onyx's compliance with the requirements set forth in § 63.8(d)(2), as well as the additional quality assurance (QA) requirements. The QC Program is required to contain descriptions of initial and subsequent CMS calibration, calibration drift, preventive maintenance, data recording, calculations and reporting, and a corrective action plan for malfunctioning CMS. Table 1-1 presents the regulatory references related to the QC program, followed by the section of this plan that addresses each specific requirement. Some references are made to other HWC MACT required facility operating plans.

This QC Program is intended to fulfill the requirements of § 63.8(d)(2), and includes information related to the procedures for each of the following operations:

- Initial and subsequent calibration of the CMS
- Determination and adjustment of the calibration drift of the CMS
- Preventive maintenance of the CMS, including spare parts inventory
- Data recording, calculations, and reporting
- Program of corrective action for malfunctioning CMS.

**Table 1-1**  
**Regulatory Checklist for the CMS QA Program**

Regulatory Citation	Description	Plan Section
§ 63.8(c)(1)(i)	Operation and maintenance of each CMS	Section 1.2, 2.3 O&M Plan CEMS Plan
§ 63.8(c)(1)(iii)	Startup, shutdown, and malfunction plan for CMS	SSMP Plan
§ 63.8(c)(3)	Verification of operational status	CMS PET Plan
§ 63.8(c)(7)(ii)	Out-of-control CMS data will not be used in averages and calculations.	Section 4.0
§ 63.8(c)(7)(ii)	Corrective actions for an out-of-control CMS	Section 4.0 and SSMP Plan
§ 63.8(c)(8)	Out-of-control CMS information to be submitted	Section 4.0
§ 63.8(d)(2)	Develop and implement QC portion of CMS QA program	Section 1.0
§ 63.8(d)(2)	QA program includes the development and submittal of the performance evaluation test plan	Section 2.1.1
§ 63.8(d)(2)(i)	Develop written procedures for initial and subsequent calibrations	Sections 2.1.1, 2.1.2
§ 63.8(d)(2)(ii)	Develop written procedures for determination and adjustment of calibration drifts	Section 2.2
§ 63.8(d)(2)(iii)	Develop written procedures for preventive maintenance and spare parts inventory	Section 2.3
§ 63.8(d)(2)(iv)	Data recording, calculations, and reporting	Sections 3.1, 3.2
§ 63.8(d)(2)(vi)	Corrective actions for malfunctioning CMS	Section 4.0
§ 63.8(e)(3)	Performance evaluation of CMS	CMS PET Plan
§ 63.8(g)	Reduction of monitoring data	Section 3.2
§ 63.10(b)(1)	Maintaining files	Section 3.1
§ 63.10(b)(2)(ix)	Maintain records of measurements from performance evaluations	Section 3.1
§ 63.10(b)(2)(vi)	Maintain records of each period during which a CMS is malfunctioning, or inoperative and out of control	Section 4.0 and SSMP Plan
§ 63.10(b)(2)(vii)	Maintain records of measurements to demonstrate compliance	Section 3.1
§ 63.10(b)(2)(viii)	Maintain records of results of CMS performance evaluations and opacity and visible emission observations	Section 3.1
§ 63.10(b)(2)(x)	Maintain records of CMS calibration checks	Section 2.1.2

Table 1-1 (continued)  
Regulatory Checklist for the CMS QA Program

Regulatory Citation	Description	Plan Section
§ 63.10(b)(2)(xi)	Maintain records of all adjustments and maintenance performed on the CMS	Section 3.1
§ 63.10(c)(1)	Recordkeeping requirements for CMS measurements (including unavoidable breakdowns and out-of-control situations)	Section 3.1
§ 63.10(c)(13)	Maintain records of total process operating time during the reporting period	Section 3.1
§ 63.10(c)(14)	Develop and implement CMS QA program procedures	Section 1.0
§ 63.10(c)(5)	Maintain records of date and time for CMS inoperability (except for zero and high-level checks)	Section 3.1
§ 63.10(c)(6)	Maintain records of date and time for CMS out-of-control periods	Section 3.1
§ 63.10(c)(8)	Maintain records of identification of each time period of exceedances - does not include periods of Startup, Shutdown, Malfunction (SSM)	Section 3.1
§ 63.10(e)(3)(i)	Submittal of semiannual excess emissions and CMS performance report	Section 3.1
§ 63.10(e)(3)(v)	Content and submittal data of excess emissions and CMS performance report	Section 3.2
§ 63.10(e)(3)(vi)	Content of summary report required by (e)(3)(vii) and (e)(3)(viii) to this section	Section 3.2
§ 63.10(e)(3)(vii)	Condition for submitting only the summary report	Section 3.2
§ 63.10(e)(3)(viii)	Condition for submitting both the summary report and excess emissions and CMS performance report	Section 3.2
§ 63.1209(b)(2)(i)	Calibration of thermocouples and pyrometers	Section 2.1
§ 63.1209(b)(3)	Frequency of CMS sampling; evaluation, computing, and recording of regulated parameter	Section 3.1
§ 63.1209(b)(5)	Calculation of rolling averages	Section 3.1
§ 63.1209(f)(1)	§ 63.1211(c) requires that CMS are installed, calibrated, and operational by the compliance date	CMS PET Plan

**Notes:**

PET Performance Evaluation Test

SSMP Startup, Shutdown, Malfunction Plan

SDP Standard Division Practices

The data collected from CMS instrumentation is used to demonstrate the unit's compliance with the performance requirements promulgated in the Interim HWC Maximum Achievable Control Technology (MACT) standard. The QA Program outlines procedures used to verify that the CMS are properly calibrated and collecting accurate data on an ongoing basis.

Due to the similarity of the three CMS systems (one for each incinerator system), general references to a CMS system or incinerator system in this document will imply all three systems. Information that is only applicable to one or two of the three systems will be clearly identified.

This document is organized as follows:

- Section 1.0 Introduction and Background
- Section 2.0 CMS Calibration and Preventive Maintenance
- Section 3.0 CMS Recordkeeping and Reporting
- Section 4.0 CMS Corrective Actions

This plan also assimilates information and procedures found in other documents. As required by § 63.6(e)(3)(vi), other documents containing procedures or information referred to in this plan will be made available for inspection when requested by the Administrator.

The remainder of this section provides an overview of the incineration system followed by a discussion on the CMS instrumentation. Section 2.0 discusses CMS initial and continuing calibration and preventive maintenance requirements. Section 3.0 addresses requirements related to facility documentation and reporting. Section 4.0 defines and discusses nonstandard operations of the CMS and applicable corrective actions.

## 1.1 Summary of Facility Information

Brief summaries which describe the fixed hearth incinerators and the rotary kiln incinerator are presented in this section.

### 1.1.1 Fixed Hearth Incinerators

Each of the fixed hearth incinerators includes the following components:

- Feed equipment

- Primary and secondary combustion chambers
- Lime injection system
- Spray dryer absorber (SDA)
- Fabric filter baghouse
- Solids and ash removal systems
- Induced draft (ID) fan and stack
- Instrumentation, controls, and data acquisition systems

Various solid and liquid wastes and gaseous feedstreams are thermally treated in the fixed hearth incinerators. Solid waste is fed to the primary (lower) combustion chamber via a feed conveyor system and pneumatic ram. Liquid waste from tanks and tanker trucks are fed to the primary combustion chamber through two atomized liquid injectors. Liquid waste from containers are fed to the primary combustion chamber through a specialty feed injector. A gaseous feedstream is fed to the Unit 2 primary combustion chamber directly from gas cylinders. Off gases from a hooded feed emission control system and from a waste handling glove box are fed directly to the Unit 3 secondary combustion chamber. Combustion chamber temperatures are maintained using natural gas fired to a dedicated burner in both the primary and secondary chambers.

Combustion gas exits the secondary combustion chamber and enters the SDA, which provides acid gas removal and cooling of the combustion gas. Combustion gas exits the SDA and is distributed to the fabric filter baghouses, which provide particulate matter removal. The induced draft fan, located downstream of the baghouses, moves the combustion gas through the system and exhausts the gas through the main stack.

Hot, wet gas is extracted downstream of the baghouse through a continuous emissions monitoring system. This system features a multi-component infrared gas analyzer that detects hydrogen chloride, carbon monoxide, and water vapor concentrations. An integrated zirconium oxide-based analyzer detects oxygen concentrations.

#### *1.1.2 Rotary Kiln Incinerator*

The rotary kiln incinerator includes the following components:

- Waste feed system
- Primary and secondary combustion chambers
- Tempering chamber
- Lime injection system
- Spray dryer absorber

- Carbon injection system
- Fabric filter baghouse
- Solids and ash removal systems
- ID fan and stack
- Instrumentation, controls, and data acquisition systems

Various solid and liquid wastes are thermally treated in the rotary kiln incinerator. Solid wastes are fed to a ram feeder via a clamshell, a drum feed conveyor, and an auxiliary feed conveyor. A hydraulic ram pushes the solid waste into the kiln. Liquid waste from tanks and tanker trucks is fed to the primary and secondary combustion chambers through atomized liquid injectors. Combustion chamber temperatures are maintained using natural gas fired to a dedicated burner in both the primary and secondary chambers.

Combustion gas exits the secondary combustion chamber and enters the tempering chamber, which provides cooling of the combustion gases. The combustion gas exits the tempering chamber and is distributed between two identical SDAs, which provide acid gas removal and additional gas cooling. A carbon injection system is utilized for controlling dioxin/furan and mercury emissions. The activated carbon is air injected into the combustion gas immediately downstream of the convergence of combustion gases from the SDAs. From the SDAs, combustion gas is distributed to fabric filter baghouses, which provide particulate matter removal. The ID fan, located downstream of the baghouses, moves the combustion gas through the system and exhausts the gas through the main stack.

Hot, wet gas is extracted downstream of the ID fan through a continuous emissions monitoring system. This system features a multi-component infrared gas analyzer that detects hydrogen chloride, carbon monoxide, and water vapor concentrations. An integrated zirconium oxide-based analyzer detects oxygen concentrations.

## 1.2 CMS Instrumentation

This section describes the CMS instruments used monitor regulated process parameters for demonstrating on-going compliance with the Interim HWC MACT emission standards. A summary of specifications for CMS instrumentation is provided in Table 1-2.

The Interim HWC MACT standard requires all CMS's be installed in locations that provide representative measurements of emissions or process parameters. All CMS

Table 1-2  
CMS Instrument Specifications

Application	Instrument	Tag Number	Manufacturer	Model	Operating Range	Location
Unit No. 2						
High BTU Liquid Feedrate	Mass Flowmeter	FT-215	Micro Motion	D 40S-SS	0-3,600 lb/hr	Feed Line
High BTU Liquid Direct Injection Feedrate	Scale	WT-215DI	Weigh-Tronix	WI-130	0-60,000 lb	Feed Line
Low BTU Liquid Feedrate	Mass Flowmeter	FT-216	Micro Motion	D 40S-SS	0-3,600 lb/hr	Feed Line
Low BTU Liquid Direct Injection Feedrate	Scale	WT-215DI	Weigh-Tronix	WI-130	0-60,000 lb	Feed Line
Specialty Feed Weight	Weigh Scale	WT-204	Toledo	8140 EXP	0-4,000 lb	# 204 Specialty Feeder
Drummed and Bulk Solids Feed Weight	Weigh Scale	WT-210	Toledo	A140	0-400 lb	Solid Charge Conveyor
Cylinder Gas Feedrate	dP Cell	FT-217	Yokogawa	YA11F	0-10 in. w.c. (0-60 lb/min)	Cylinder Gas Feed System
PCC Temperature	Type K Thermocouple	TT-200A/B	Modicon	B883-200	0-2500 °F	Primary Chamber
SCC Temperature	Type K Thermocouple	TT-219A/B	Modicon	B883-200	0-2500 °F	Secondary Chamber
PCC Pressure	Pressure Transmitter	PT-200	Rosemont	1151DP	-7.5 to 2.5 in. w.c.	Primary Chamber
ESV Position	Position Switch	ZS-224	Square-D	9007 CG2B2	open/close	Emergency Stack
Baghouse Inlet Temperature	Type K Thermocouple	TT-270	Modicon	833-200	0-2500 °F	SDA Outlet
Combustion Gas Flow Rate	dP Cell	FT-283	Rosemount	1151DR	0-20,000 acfm	Stack
Stack Gas Oxygen Concentration	Zirconium Oxide Analyzer	AT-289	COSA	ZFN-11YA1-2Z1	0-25%	CEMS Building
Stack Gas Carbon Monoxide Concentration	Multicomponent Infrared Photometer with Integrated Zirconium Oxide Oxygen Analyzer	AT-288E	EcoChem	MC3	0-200 / 0-3000 ppmv	CEMS Building
Stack Hydrogen Chloride Concentration					0-1000 ppmv	
Stack Gas Moisture Concentration					0-60%	
Stack Gas Oxygen Concentration					0-25%	

Table 1-2(continued)  
CMS Instrument Specifications

Application	Instrument	Tag Number	Manufacturer	Model	Operating Range	Location
Unit No. 3						
High BTU Liquid Feedrate	Mass Flowmeter	FT-315	Micro Motion	DS-040	0-3,600 lb/hr	Feed Line
High BTU Liquid Direct Injection Feedrate	Scale	WT-315 DI	Weigh-Tronix	WI-130	0-60,000 lb	Feed Line
Low BTU Liquid Feedrate	Mass Flowmeter	FT-316	Micro Motion	DS-040	0-3,600 lb/hr	Feed Line
Low BTU Liquid Direct Injection Feedrate	Scale	WT-315 DI	Weigh-Tronix	WI-130	0-60,000 lb	Feed Line
Specialty Feed Weight	Weigh Scale	WT-304	Toledo	AI40 EXP	0-2,000 lb	#304 Hooded Feeder
Drummed and Bulk Solids Feed Weight	Weigh Scale	WT-310	Toledo	A140	0-400 lb	Solid Charge Conveyor
PCC Temperature	Type K Thermocouple	TT-300A/B	Modicon	883-200	0-2500 °F	Primary Chamber
SCC Temperature	Type K Thermocouple	TT-319A/B	Modicon	883-200	0-2500 °F	Secondary Chamber
PCC Pressure	Pressure Transmitter	PT-300	Rosemount	1151 dP	-7.5 to 2.5 in. w.c.	Feed Line
TRV Position	Position Switch	ZS-324	Square-D	9007 CG2B2	open/close	Emergency Stack
Baghouse Inlet Temperature	Type K Thermocouple	TT-370	Modicon	833-200	0-2500 °F	SDA Outlet
Combustion Gas Flow Rate	dP Cell	FT-383	Rosemount	1151 DR	0-20,000 acfm	Stack
Stack Gas Oxygen Concentration	Zirconium Oxide Analyzer	AT-389	COSA	ZFN-11YA1-2Z1	0-25%	CEMS Building
Stack Gas Carbon Monoxide Concentration	Multicomponent Infrared Photometer with Integrated Zirconium Oxide Oxygen Analyzer	AT-388E	EcoChem	MC3	0-200 / 0-3000 ppmv	CEMS Building
Stack Hydrogen Chloride Concentration					0-1000 ppinv	
Stack Gas Moisture Concentration					0-60%	
Stack Gas Oxygen Concentration					0-25%	

Table 1 (continued)  
CMS Instrument Specifications

Application	Instrument	Tag Number	Manufacturer	Model	Operating Range	Location
Unit No. 4						
Waste Feedrate to X-10 Nozzle	Mass Flowmeter	FT-129	Micro Motion	DS100S-128	0-7,000 lb/hr	Feed Line
Waste Feedrate to X-11 Nozzle	Mass Flowmeter	FT-138	Micro Motion	D100S-HY	0-6,000 lb/hr	Feed Line
Waste Feedrate to X-12 Nozzle	Mass Flowmeter	FT-145	Micro Motion	DL100S-SS	0-8,000 lb/hr	Feed Line
Waste Feedrate to X-22 Nozzle	Mass Flowmeter	FT-212	Micro Motion	D1D00S-SS	0-7,000 lb/hr	Feed Line
Clam Shell Feed Weight (shredded solids)	Load Cell	WT-001	Toledo	8140	0-2,000 lb	Ram Feed Hopper
Drum Conveyor Solids Weight	Load Cell	WT-014A	Toledo	8140	0-1,000 lb	Drum Conveyor
Auxiliary Conveyor Solids Weight	Load Cell	WT-14B	Toledo	8140	0-200 lb	Auxiliary Conveyor
PCC Temperature	Pyrometer	TT-305A/B	Ircon	Modline4 44-99-F- 1-0-1	0-3,000 °F	Kiln Outlet
SCC Temperature	Type R Thermocouple	TT-317A/B	Chessel	3510	0-3,000 °F	SCC Outlet
PCC Pressure	Pressure Transmitter	PT-300	Rosemount	1151DR2F	-9.0 to 1.0 in. w.c.	Kiln Hood
Surge Vent Position	Position Switch	ZSC-026	Square-D	9007 CG2B2	open/close	Kiln Face
TRV Position	Position Switch	ZSC-316	Square-D	9007 CG2B2	open/close	Emergency Stack
Carbon Feedrate	Feeder	C-17	K-Tron	K2T35	0-100	Carbon Inject. System
Carbon Injection Carrier Gas Supply Pressure	Pressure Switch	PSL-438A	Dwyer	3330	Trip Points: ± 5 in. w.c.	Carbon Injection Line
Carbon Feeder Discharge Pressure	Pressure Switch	PSH-438B	Dwyer	3215	Trip Points: < 3 psig > 13 psig	Carbon Injection Line

Table 1 (continued)  
CMS Instrument Specifications

Application	Instrument	Tag Number	Manufacturer	Model	Operating Range	Location
Unit No. 4 (continued)						
SDA X-18 Outlet Temperature (Baghouse Inlet Temperature)	Type K Thermocouple	TT-417A/B	Modicon	B883-200	0-2,500 °F	SDA X-18 Outlet
SDA X-19 Outlet Temperature (Baghouse Inlet Temperature)	Type K Thermocouple	TT-418A/B	Modicon	B883-200	0-2,500 °F	SDA X-19 Outlet
Combustion Gas Flowrate	Pitot Tube/dP Cell	FT-559A/B	Automation Service	1151DRF2283	0-55,000 acfm	Stack
Stack Gas Oxygen Concentration	Zirconium Oxide Analyzer	AT-560A/B	COSA	ZFN-11YA1-2Z1	0-20%	CEMS Building
Stack Gas Carbon Monoxide Concentration	Multicomponent Infrared Photometer with Integrated Zirconium Oxide Oxygen Analyzer	AT-556E	EcoChem	MC3	0-200 / 0-3000 ppmv	CEMS Building
Stack Hydrogen Chloride Concentration					0-1000 ppmv	
Stack Gas Moisture Concentration					0-60%	
Stack Gas Oxygen Concentration					0-25%	

operating parameter measurement devices at the Onyx facility are installed in compliance with this requirement. A description of the types of CMS instrumentation follows:

**Mass/Feedrate Monitors:** Liquid waste feedrates from tanks are measured by coriolis mass flowmeters. Direct inject liquid feedrates from tanker truck are calculated using the continuously monitored weight of the tanker. All solid waste charges are weighed using a scale/load cell prior to being feed to the incinerator. These measurements are used to calculate pumpable waste, total waste, and constituent feedrates.

For Unit 4, the output of a calibrated feeder is utilized to calculate the feedrate of powdered activated carbon, which is injected into the plenum upstream of the baghouses.

**Pressure/Differential Pressure Monitors:** Primary combustion chamber pressure is measured by diaphragm actuated pressure transmitters. The position of the damper immediately upstream of the ID fan is varied to control stack gas flowrate and to maintain kiln combustion chamber negative pressure (draft). The primary combustion chamber pressure is interlocked with waste feeds.

For Unit 2, pressure drop in the cylinder gas feedstream is measured and converted to a feedrate. The feedrate is used to calculate this feedstream's contribution to the chlorine, low volatile metals, and semivolatile metals feedrates to the incinerator.

For Unit 4, pressure switches are utilized to ensure that the carbon feeder discharge pressure, and the carbon injection air blower discharge pressure are within the design limits.

The pressure drop across a pitot tube in the stack is continuously monitored and used to calculate the stack gas flowrate.

**Temperature Monitors:** For Units 2 and 3, redundant thermocouples are used to measure the temperature in both combustion chambers. A thermocouple is also located at the exit to the SDA and is the primary element for the SDA exit temperature control loop.

Unit 4 is equipped with redundant pyrometers in the primary chamber and redundant thermocouples in the secondary chamber. Each SDA outlet is equipped with redundant thermocouples used for temperature control and monitoring of the baghouse inlet temperature.

**Emergency Safety Vent Position Monitors:** The position of the emergency safety vent (ESV) is indicated as open or closed by a position transmitter. No waste or fuel can be fed if the ESV position is "open". The Emergency Safety Vent (ESV) Plan provides details on the ESV systems.

**Bag Leak Detection System:** A triboelectric sensor is located downstream of the ID fan and monitors the relative particulate matter loading of the combustion gas exiting the baghouses. Alarms and interlocks based on this relative measurement are indications of a potential bag leak or failure. Procedures for setup and adjustments to the bag leak detection system are not covered by this QC program. The Operation and Maintenance Plan provides details on the bag leak detection system.

**Continuous Emissions Monitoring System:** The CEMS continuously samples and analyzes stack gas for the concentrations of carbon monoxide (CO), Hydrogen Chloride (HCl), and moisture using a multicomponent infrared photometer. The oxygen concentration of the sampled gas is analyzed simultaneously using an integrated zirconium oxide analyzer. A back-up zirconium oxide O<sub>2</sub> analyzer also monitors stack gas O<sub>2</sub> concentration. These data are used to calculate the stack gas CO and HCl concentrations on a dry basis, corrected to 7% O<sub>2</sub>. The CEMS QA Plan provides additional details on the CEMS.

## 2.0 CMS CALIBRATION AND PREVENTIVE MAINTENANCE

This section discusses the calibration and preventive maintenance requirements to meet the requirements of § 63.8(d).

### 2.1 CMS Calibration

To ensure ongoing compliance with the Interim HWC MACT standard, it is essential that the data collected from the CMS be measured and recorded in an accurate manner. Initial calibrations, subsequent calibration, and CEMS calibrations are described in this section.

#### 2.1.1 Initial CMS Calibration

As part of Onyx's Quality Control Program, the CMS instruments were initially calibrated prior to the Interim HWC MACT compliance date. Calibration prior to the compliance date is required so that all collected data are reliable and accurate. All initial calibration data are part of the operating record. Initial calibrations of new/replacement instruments will be performed per the manufacture's written procedures. In lieu of an initial calibration for new/replacement instruments or instrument components, the facility may use a manufacturer's certification.

#### 2.1.2 Subsequent CMS Calibration

Subsequent calibrations on CMS instrumentation will be performed as needed and in accordance with the manufacture's written procedures. Calibrations will be performed as corrective measures for high calibration drift. Calibrations may be required when restoring CMS instruments after maintenance or repairs. All calibration adjustments will be documented by records of the calibration drift determined before and after the instrument was serviced.

Some instruments such as differential pressure cells must be removed from service and bench calibrated. To minimize downtime these instruments may be replaced with a calibrated spare. The Unit 4 primary combustion chamber pyrometers will be replaced at least annually with a factory calibrated pyrometer. Electronic checks and replacements of thermocouples will be performed per the facility's Thermocouple Calibration, Operation, and Replacement Procedure.

A calibration record form is available for each CMS instrument and will be used to document calibration audits, calibrations, and replacements. The most recently completed calibration record documents that the instrument in service meets the quality control criteria set forth by this program. These calibration records contain "calibration notes" which provide the instrument technician with procedures specific to a given instrument. The calibration record forms for CMS instruments are incorporated in this QC Program by reference.

### 2.1.3 CEMS Calibration Audits and Calibration

CEMS QA/QC procedures are provided by the *Continuous Emission Monitoring System Quality Assurance Plan*. These procedures are maintained at the facility and describe the requirements for CEMS drift checks, audits, calibrations, preventive maintenance, and recordkeeping.

### 2.2 CMS Calibration Audits

CMS calibration audits are performed to determine the calibration drift (CD) of CMS instruments. Calibration Drift (CD) is the bias between the CMS instrument reading and a calibration reference. Table 2-1 presents the requirements for CMS calibration audits. Each CMS instrument will be subjected a calibration audit at the frequency indicated in Table 2-1. The calibration audit will be performed at the low-level (zero) and high-level checks indicated. The calibration check will confirm that all process variable indications (e.g., local reading, control room display) at the high-level value agree with the calibration reference within  $\frac{1}{2}$  of the required tolerance. Calibration adjustments/corrective actions must be taken if this calibration drift is greater than  $\frac{1}{2}$  of the required tolerance. If the calibration drift exceeds the required tolerance, the instrument is considered out-of-control. Section 4.0 describes the corrective actions for out-of-control, inoperative, and malfunctioning CMS.

If the accuracy of a CMS instrument is in question, the CD is determined and documented prior to performing maintenance, repairs, or adjustments. The troubleshooting/calibrations of CMS instruments will be performed in a manner consistent with the manufacturer's written procedures and recommendations. The CD determined after calibrations/corrective actions have been taken will document the effects of the adjustments and demonstrate that the instrument is performing properly.

Calibration records will document CD, which is an indicator of the stability of the CMS calibration over time. The amount of drift and stability is dependant on the type of instrument and the calibration frequency. Onyx may increase or decrease the frequency of particular calibration audits to the extent warranted by an assessment of an instrument's stability. Onyx will maintain regularly scheduled calibration audit intervals for each CMS instrument. Calibrations will be performed to prevent excessive CD and to maintain the validity of the data collected from the monitoring system.

Table 2-1  
CMS Calibration Audit Requirements

Application	Instrument	Tag Number	Frequency of Calibration Audit	Low Level Check Point	High Level Check Point	Tolerance
Unit No. 2						
High BTU Liquid Feedrate	Mass Flowmeter	FT-215	Annually	0-5 lb/min	15-25 lb/min	10%
High BTU Liquid Direct Injection Feedrate	Scale	WT-215DI	Quarterly	0 lb	25,000 lb	10%
Low BTU Liquid Feedrate	Mass Flowmeter	FT-216	Annually	0-5 lb/min	15-25 lb/min	10%
Low BTU Liquid Direct Injection Feedrate	Scale	WT-215DI	Quarterly	0 lb	25,000 lb	10%
Specialty Feed Weight	Weigh Scale	WT-204	Quarterly	0 lb	~500 lb	10%
Drummed and Bulk Solids Feed Weight	Weigh Scale	WT-210	Quarterly	0 lb	~50 lb	10%
Cylinder Gas Feedrate	dP Cell	FT-217	Annually	0 in. w.c.	10 in. w.c.	10%
Primary Combustion Chamber Temperature	Type K Thermocouple	TT-200A/B	Refer to the Thermocouple Calibration, Operation, and Replacement Procedure			
Secondary Combustion Chamber Temperature	Type K Thermocouple	TT-219A/B	Refer to the Thermocouple Calibration, Operation, and Replacement Procedure			
Primary Combustion Chamber Pressure	Pressure Transmitter	PT-200	Quarterly	-7.5 to -6.5	1.5 to 2.5 in w.c.	10%
ESV Position	Position Switch	ZS-224	Annually	AWFCO interlock energized when open		Pass
Baghouse Inlet Temperature	Type K Thermocouple	TT-270	See Calibration Record Form			
Combustion Gas Flow Rate	dP Cell	FT-283	Annually	0-0.05 in. w.c.	0.45-0.50 in. w.c.	
Stack Gas Oxygen Concentration	Zirconium Oxide Analyzer	AT-289	Per CEMS QA Plan			
Stack Gas Carbon Monoxide Concentration	Multicomponent Infrared Photometer with Integrated Zirconium Oxide Oxygen Analyzer	AT-288E	Per CEMS QA Plan			
Stack Hydrogen Chloride Concentration						
Stack Gas Moisture Concentration						
Stack Gas Oxygen Concentration						

Table 2-1 (continued)  
CMS Calibration Audit Requirements

Application	Instrument	Tag Number	Frequency of Calibration Audit	Low Level Check Point	High Level Check Point	Tolerance
Unit No. 3						
High BTU Liquid Feedrate	Mass Flowmeter	FT-315	Annually	0-5 lb/min	15-25 lb/min	10%
High BTU Liquid Direct Injection Feedrate	Scale	WT-315DI	Annually	0 lb	25,000 lb	10%
Low BTU Liquid Feedrate	Mass Flowmeter	FT-316	Annually	0-5 lb/hr	15-25 lb/min	10%
Low BTU Liquid Direct Injection Feedrate	Scale	WT-315DI	Annually	0 lb	25,000 lb	10%
Specialty Feed Weight	Weigh Scale	WT-304	Quarterly	0 lb	~200 lb	10%
Drummed and Bulk Solids Feed Weight	Weigh Scale	WT-310	Quarterly	0 lb	~50 lb	10%
Primary Combustion Chamber Temperature	Type K Thermocouple	TT-300A/B	Refer to the Thermocouple Calibration, Operation, and Replacement Procedure			
Secondary Combustion Chamber Temperature	Type K Thermocouple	TT-319A/B	Refer to the Thermocouple Calibration, Operation, and Replacement Procedure			
Primary Combustion Chamber Pressure	Pressure Transmitter	PT-300	Quarterly	-7.5 to -6.5	1.5 to 2.5 in. w.c.	10%
ESV Position	Position Switch	ZS-324	Annually	AWFCO interlock energized when open		Pass
Baghouse Inlet Temperature	Type K Thermocouple	TT-370	Refer to the Thermocouple Calibration, Operation, and Replacement Procedure			
Combustion Gas Flow Rate	dP Cell	FT-383	Annually	0-0.05 in. w.c.	0.45-0.50 in. w.c.	10%
Stack Gas Oxygen Concentration	Zirconium Oxide Analyzer	AT-389	Per CEMS QA Plan			
Stack Gas Carbon Monoxide Concentration	Multicomponent Infrared Photometer with Integrated Zirconium Oxide Oxygen Analyzer	AT-388E	Per CEMS QA Plan			
Stack Hydrogen Chloride Concentration						
Stack Gas Moisture Concentration						
Stack Gas Oxygen Concentration						

Table 2-1 (continued)  
CMS Calibration Audit Requirements

Application	Instrument	Tag Number	Frequency of Drift Check/Accuracy Audit	Low Level Check Point	High Level Check Point	Tolerance
Unit No. 4						
Waste Feedrate to X-10 Nozzle	Mass Flowmeter	FT-129	Annually	0-5 lb/min	15-25 lb/min	10%
Waste Feedrate to X-11 Nozzle	Mass Flowmeter	FT-138	Annually	0 lb	21,000 lb	10%
Waste Feedrate to X-12 Nozzle	Mass Flowmeter	FT-145	Annually	0-5 lb/min	15-25 lb/min	10%
Waste Feedrate to X-22 Nozzle	Mass Flowmeter	FT-212	Annually	0 lb	21,000 lb	10%
Clam Shell Feed Weight (shredded solids)	Load Cell	WT-001	Quarterly	0 lb	~200 lb	10%
Drum Conveyor Solids Weight	Load Cell	WT-014A	Quarterly	0 lb	~100 lb	10%
Auxiliary Conveyor Solids Weight	Load Cell	WT-14B	Quarterly	0 lb	~50 lb	10%
Primary Combustion Chamber Temperature	Pyrometer	TT-305A/B	Replace at least annually with factory calibrated Pyrometer			
Secondary Combustion Chamber Temperature	Type R Thermocouple	TT-317A/B	Refer to the Thermocouple Calibration, Operation, and Replacement Procedure			
Primary Combustion Chamber Pressure	Pressure Transmitter	PT-300	Quarterly	-9.0 to -8.0 in. w.c.	0 to 1.0 in. w.c.	10%
Surge Vent Position	Position Switch	ZS-026	Annually	AWFCO interlock energized when open		Pass
ESV Position	Position Switch	ZS-324	Annually	AWFCO interlock energized when open		Pass
Carbon Feedrate	Feeder	WT-438	Quarterly	0 lb/min	6-30 lb/min	10%
Carbon Injection Carrier Gas Low Pressure	Pressure Switch	PSL-438A	Annually	Energize Switch		Pass
Carbon Injection Carrier Gas High Pressure	Pressure Switch	PSH-438B	Annually	Energize Switch		Pass

Table 2-1 (continued)  
CMS Calibration Audit Requirements

Application	Instrument	Tag Number	Frequency of Drift Check/Accuracy Audit	Low Level Check Point	High Level Check Point	Tolerance
Unit No. 4 (continued)						
SDA X-18 Outlet Temperature (Baghouse Inlet Temperature)	Type K Thermocouple	TT-417A/B	Refer to the Thermocouple Calibration, Operation, and Replacement Procedure			
SDA X-19 Outlet Temperature (Baghouse Inlet Temperature)	Type K Thermocouple	TT-418A/B	Refer to the Thermocouple Calibration, Operation, and Replacement Procedure			
Combustion Gas Flowrate	Pitot Tube/dP Cell	FT-559A/B	Annually	0 in. w.c.	1.74 in w.c.	10%
Stack Gas Oxygen Concentration	Zirconium Oxide Analyzer	AT-560A/B	Per CEMS QA Plan			
Stack Gas Carbon Monoxide Concentration	Multicomponent Infrared Photometer with Integrated Zirconium Oxide Oxygen Analyzer	AT-556E	Per CEMS QA Plan			
Stack Hydrogen Chloride Concentration						
Stack Gas Moisture Concentration						
Stack Gas Oxygen Concentration						

### 2.3 Preventive Maintenance

Onyx takes daily proactive measures to assure that potential problems with the CMS are quickly identified and avoided, if possible. Daily maintenance checks include:

- Verification that process variables are reasonable
- Comparison of readings from redundant instruments
- Cleaning and visual check of monitoring equipment
- Communication between operators and instrument technicians

These checks are documented on a daily logsheet for each incinerator. The preventive maintenance on the CMS also includes the calibration audits previously described. All necessary parts for routine repairs of the affected CMS equipment are made readily available onsite. A spare parts inventory for each component of the CMS is included in the records maintained by the Maintenance Department. Additional details regarding preventive maintenance applicable to the CMS are provided in the facility's Operation and Maintenance Plan and the CEMS QA Plan.

### 3.0 CMS RECORDKEEPING AND REPORTING

This section discusses recordkeeping and reporting requirements for CMS instrumentation as specified by § 63.1211.

#### 3.1 Recordkeeping

Onyx will follow the recordkeeping requirements as specified in § 63.10(b), including the semiannual excess emissions and CMS performance report. Onyx will maintain these records of CMS data for a minimum of 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record. At a minimum, the most recent 2 years of data will be retained onsite. Below is a brief summary of these requirements.

Onyx will maintain records on the following:

- The occurrence and duration of each startup, shutdown, or malfunction of operation.
- The occurrence and duration of each malfunction of the air pollution control and monitoring equipment. Maintenance performed on the air pollution control and monitoring equipment
- Actions taken during periods of startup, shutdown, and malfunction (including corrective actions to restore the process or air pollution control system to normal operation) when such actions are different the procedures outlined in the SSMP
- All information necessary to demonstrate conformance with the SSMP
- Each period in which a CMS is malfunctioning or inoperative (including out-of-control periods)
- All required measurements needed to demonstrate compliance with a relevant standard.
- All results of performance tests, CMS performance evaluations, and opacity and visible emission observations
- All CMS calibration checks
- All adjustments and maintenance performed on CMS
- All required CMS measurements (including data recorded during unavoidable CMS breakdowns and out-of-control periods)
- The date and time identifying each period during which the CMS was inoperative except for zero (low level) and high level checks

- The date and time identifying each period during which the CMS was out-of-control as defined by § 63.8(c)(7)
- The specific identification (date and time of commencement and completion) of each period of excess emissions and parameter monitoring exceedances, as defined in the relevant standard, that occurs during periods other than startup, shutdowns, and malfunctions.
- The nature and cause of any malfunction
- The corrective action taken or preventive measures adopted
- The nature of the repairs or adjustments to the CMS that was inoperative or out-of-control
- The total process operating time during the reporting period
- All procedures that are part of quality control program developed and implemented for CMS under § 63.8(d).

All CMS instrumentation will be operated on a continuous basis. The detector response will be evaluated at least every 15 seconds, and these values will be used to calculate regulated parameters. For parameters interlocked with the AWFCO system on an hourly rolling average basis, raw data will be averaged and recorded at least once per minute. One minute averages will be used to calculate the hourly rolling averages. The pumpable waste, total waste, and constituent feedrate operating parameter limits are based on rolling totals in lieu of rolling averages.

An integral part of the CMS is the data acquisition and data historian systems, which records all operating data generated by the CMS instruments. The data historian and associated archive files are part of the operating record. CMS instrument calibrations, maintenance activities, and corrective actions are recorded and kept in the operating record. All data collected during CMS PETs are recorded and kept in the operating record.

### 3.2 Reporting

Onyx will follow the reporting requirements as specified in § 63.10. In addition, Onyx will develop and include in the operating record a Documentation of Compliance (DOC) per § 63.1211(c). The DOC must include a signed and dated certification that the CEMS and CMS are installed, calibrated, and continuously operating in compliance with the requirements of Subpart EEE.

Raw data from the CMS will be collected, reduced as described in § 63.8(g), and included in the CMS PET report. This data will be analyzed to determine compliance with the HWC MACT and the results will be submitted as part of the notification of compliance required by § 63.1207(j).

The content and deadline requirements for the excess emissions and monitoring system performance reports are specified in § 63.10(e)(3)(v). The requirements for the summary report are given in § 63.10(e)(3)(vi).

As noted in § 63.10(e)(3)(vii), Onyx is required to only submit the summary report if the total duration of excess emissions or process or control system parameter exceedances for the reporting period is less than one percent of the total operating time for the reporting period, and CMS downtime for the reporting period is less than five percent of the total operating time for the reporting period. Conversely, additional reporting is required by § 63.10(e)(3)(viii) if the total duration of exceedances, or the total CMS downtime during the reporting period, is greater than the allowable percentage of the reporting period. Table 3-1 provides a list of Onyx's reporting requirements.

Table 3-1 Reporting Requirements

Regulatory Citation	Description	Frequency
§ 63.1211(c)	Record Documentation of Compliance in the operating record	Once
§ 63.10(d)(2)	Before Title V permit has been issued, owner operator must submit results of performance test.	By the 60th day following every performance test
§ 63.10(d)(2)	After Title V permit has been issued, owner operator must submit results of required performance tests.	By the 60th day following required performance test
§ 63.10(d)(4)	Progress reports	As specified in written extension of compliance
§ 63.10(d)(5)(i)	Periodic startup, shutdown, and malfunction reports (during reporting period)	Submitted simultaneous with excess emission report
§ 63.10(d)(5)(ii)	Startup, shutdown, and malfunction reports when actions are taken that are inconsistent with SSMP.	2 working days from commencement of action, followed with a letter explaining extent within 7 working days.
§ 63.10(e)(3)(i)	Submittal of semiannual excess emissions and CMS performance report	Semiannually - by the 30th day following the end of each calendar half performance test

#### 4.0 CMS CORRECTIVE ACTIONS

If a CMS is found to be out-of-control, inoperative, or malfunctioning, corrective actions must be taken to return the CMS to normal operation. Definitions used in determining the type of corrective action required are given below.

Out-of-control: A CMS is out-of-control if:

- The zero (low level), mid-level, or high-level calibration drift exceeds two times the applicable CD specification in the applicable performance specification or procedure; or
- The CMS fails a performance test audit, relative accuracy audit, relative accuracy test audit, or linearity test audit.

The only applicable performance specification to the CMS is Performance Specification (PS) 4B of 40 CFR Part 63, Appendix B. PS 4B applies to the O<sub>2</sub> and CO CEMS. The requirements of PS 4B and additional requirements Onyx imposes on the CEMS are detailed in the CEMS QA Plan. In the absence of promulgated performance specification applicable to non-CEMS CMS instruments, Onyx has self-imposed a high-level CD specification, as described in Section 2.0.

When a CMS is out-of-control, Onyx will take the necessary corrective action and shall repeat all necessary tests which indicate that the system is out-of-control. Corrective actions and retesting will continue until the CMS is returned to normal operation. The beginning of the out-of-control period is the hour that the calibration drift indicates that the CMS has exceeded its performance specifications. The end of the out-of-control period is the hour following the completion of corrective action and successful demonstration that the CMS is within its allowable limits. During the period the CMS is out-of-control, recorded data shall not be used in data averages and calculations, or to meet any data availability requirement established under this part.

Onyx will submit all information concerning out-of-control periods, including start and end dates and hours, and descriptions of corrective actions taken, in the excess emissions and continuous monitoring system performance report required by § 63.10(e)(3).

Malfunction: For use in this plan, malfunction is defined as any sudden, infrequent, and not reasonably preventable failure of air pollution control or monitoring equipment.

Malfunction also includes the failure of a process or any process equipment to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.

The *Program of Corrective Actions for Malfunctions* is Attachment 4 of the SSMP Plan. This program addresses how the incinerator will be operated and maintained during malfunctions. In this program, potential malfunctions are listed for each portion of the incinerator system. The malfunctions are events that are recognized by the operator, or indicated by an alarm, and threaten to cause an exceedance. In the response to the malfunction and/or alarms, the operator will apply discretion and attempt to maintain the incinerator system within regulatory limits. In the program of corrective actions, potential causes of each malfunction are listed. The operator will utilize process knowledge, job experience, and, if needed, assistance from other personnel to identify the cause of the malfunction. For each potential cause, actions to correct the failure are listed. The corrective actions prescribed may require the collaboration of multi-disciplined personnel who are qualified to return the incinerator system to proper working conditions (i.e., maintenance personnel, instrument technicians, engineering)